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OF THE
Royal Horticultural Society

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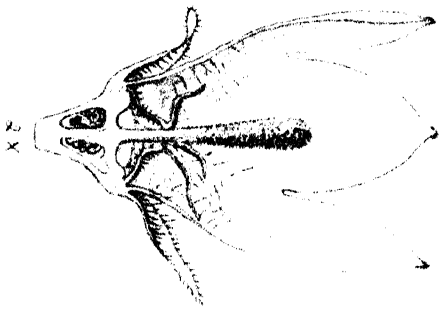
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Wahlenbergia serpyllifolia



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WAHLENBERGIAS.

THE coloured illustration of *Wahlenbergia serpyllifolia* which faces this page is reproduced from a drawing by Miss LILIAN SNELLING, whose work is now well known from the many plants she has figured in the *Botanical Magazine*. The drawing was made from a plant in Mr. F. C. STERN's garden at Goring-by-Sea.

The genus *Wahlenbergia* is a large one closely allied to *Campanula*, and the flowers of *Wahlenbergias* and *Campanulas* bear a great resemblance to one another both generally and in detail. The only distinction between the two genera is found in the ripe fruit. Whereas in *Campanula* the capsule opens by valves below the calyx lobes to permit the escape of the seeds, in *Wahlenbergia* the opening valves are found within the calyx lobes at the top of the fruit.

In the arrangement of the floral organs and in the details of pollination the two genera are alike, and they are alike, too, in the possession of milky juice.

While, however, the *Campanulas* are found only in the northern hemisphere, the *Wahlenbergias* are distributed over the greater part of the world and have their headquarters in the southern hemisphere, being especially numerous in S. Africa. They spread from the Cape northwards into tropical Africa, Madagascar, Socotra, Egypt, the Canary Islands, Azores, Madeira, Europe (one occurring from Great Britain eastwards), the Himalaya, Tibet, Western China, Japan, the Malay Archipelago, Australia, New Zealand, South America, and the islands of Juan Fernandez and St. Helena.

The difference between the garden-worthiness of the *Campanulas*

and the *Wahlenbergias* is as striking as the difference in the distribution of the two genera. While nearly all species of *Campanula* are well worth a place in our gardens, comparatively few of the *Wahlenbergias* have flowers large enough to render them objects of desire.

The genus includes annuals, perennial herbs, and shrubby species, the last found particularly in S. Africa and in the islands of St. Helena and Juan Fernandez.

Attempts have been made from time to time to split the genus up into smaller groups, but as the characters available for the purpose are not important ones these attempts have met with scant success, and it is far better to follow BENTHAM and HOOKER and group *Edraianthus* (*Hedraeanthus*), *Cervicina*, and *Streleskia* under the name *Wahlenbergia*. These attempts have led to considerable confusion in naming the plants in gardens, and we have set out the names which often occur in the comments made on the species mentioned below. Some of the species which have been known for many years were naturally put in the genus *Campanula* at first, and this name still persists for some of them.

Africa is the home of about sixty species, the majority being annuals with flowers from $\frac{1}{8}$ inch to $\frac{1}{2}$ inch in diameter. Only a few of those with larger flowers have been cultivated in this country, including the annual *W. capensis*, which was introduced in 1803 and figured under the name *Campanula capensis* in the Botanical Magazine, t. 782, and in ANDREWS' Botanist's Repository, t. 238, as *Roella decurrens*. This, like the other Cape species, needs greenhouse protection. It grows to about 18 inches in height and bears irregularly-toothed, hairy, lanceolate or ovate-lanceolate leaves from 1 to 2 inches in length. The long, slender peduncles carry solitary flowers drooping at first but eventually erect, blue-green outside, with the inner part of the lobes violet, passing to a green ring at their origin and dark blue in the tube.

Another annual species, *W. undulata*, introduced in 1887 by Mr. W. WATSON from S. Africa, is figured in the Botanical Magazine, t. 7174. It is rather dwarfer and has inch-long, hairy leaves, sessile or clasping the stem, ovate-oblong or lanceolate, with crenate or toothed undulate margins. The peduncles are few-flowered, and the five-lobed corolla, up to 1 inch in diameter, is violet-blue.

W. capillacea, also from the Cape, is an erect perennial about a foot in height with numerous $\frac{1}{4}$ - to $\frac{1}{2}$ -inch entire thread-like leaves in fascicles. The stalked flowers are in terminal leafless panicles, blue, funnel-shaped, and about $\frac{1}{2}$ inch long. It was introduced in 1822.

Another perennial Cape species, the shrubby *W. robusta* (*W. rigida*), has been introduced recently and given an A.M. when shown by Mr. T. HAY, of Hyde Park. It reaches about 2 feet high, has rigid, spreading woody branches with short, oblong, leathery leaves, mostly in fascicles and often mucronate, and produces from one to three tubular, bluish-lilac flowers, spreading at the mouth and about $\frac{1}{2}$ inch in length in most of the leaf axils.

The curious *W. tuberosa*, introduced from Juan Fernandez in 1873 by Messrs. VEITCH, and figured in the Botanical Magazine, t. 6155, and in REGEL'S Gartenflora in 1877, p. 213, also needs the protection of a greenhouse. This plant, so different from the majority of the species, is a perennial with a tuberous root-stock looking like a cluster of small potatoes on the soil surface, from which spring loosely-branched stems about 24 inches long, with spreading linear leaves and numerous bell-shaped, erect flowers about $\frac{1}{2}$ inch long at the tips of the branches of the panicle. The corolla is white, with bright rose-red bands outside.

The species of greatest beauty, however, are those suitable for the rock garden and the alpine house, and of these the chief are natives either of Europe or of New Zealand.

One of them, the annual *W. hederacea*, is a native of boggy places in the British Isles as well as of countries farther east, and it is well worth introducing to bog gardens. It is not very easy to start, but when once established it will spread and be certain to give pleasure every summer. Seed should be sown on sphagnum, or in a more or less unoccupied place in the bog garden, as soon as it is ripe. The slender creeping stems bear small, stalked, ivy-shaped leaves and, opposite each, a small, pale blue, bell-shaped flower with its lobes recurved. The flowers are numerous enough to give a cloudy blue tinge to the bog when the plant is established, but it never becomes a nuisance or a menace to the other occupants of the bog, as do so many creeping plants.

The New Zealand and Australian species in cultivation are best treated as annuals or biennials and raised annually from seed, although some of them are perennial in their native land and may there be propagated by division, as, for instance, the variable New Zealand *W. albomarginata*, which is figured in the Botanical Magazine, t. 6613, under the name *W. saxicola*. An alternative with the perennial species from these regions is to take off pieces and pot them in early autumn, protecting them under glass.

W. albomarginata makes a rosette of rather narrow leaves about an inch long, with reddish-brown margins (not white as the name suggests) and tinged reddish beneath. There are a few hairs on the petioles, but the plant is otherwise glabrous. From the rosette several one-flowered peduncles arise, growing up to 8 inches in height and bearing white or blue campanulate flowers up to $1\frac{1}{4}$ inch in diameter. Though this species sometimes occurs on the rocks in the subalpine districts of South Island, it is not really a rock plant, but is more at home on the edge of forests and as a member of the grassy carpet between the tussocks of grass so typical of much of the New Zealand scenery, and in the drier parts of river-bed associations. In the South Island it grows in the tall tussock grass formation in the Hector Mountains, up to 3,300 feet, where snow often persists until December, but in the North Island it is very common in the low tussock formations at about 2,000 feet, and is there among the earliest of early

summer flowers, often in flower by December. Unfortunately, this plant has been wrongly identified in many instances with *W. saxicola* of DE CANDOLLE'S monograph, another perennial species, and under this name it is often grown in gardens.

The true *W. saxicola* (*Campanula saxicola* of R. BROWN) is a native of Tasmania. It is figured in HOOKER'S *Flora Tasmanica*, vol. i, p. 239, t. 71, fig. A only, and differs from *W. albomarginata* in the rosette leaves being without stalks and green on both sides, and in the much smaller flowers, scarcely above $\frac{1}{8}$ inch in diameter, of a bright light blue with less spreading lobes.

An allied New Zealand plant, *W. congesta*, grows only 2 inches high and has pale blue flowers about $\frac{1}{8}$ inch in diameter, and a globose capsule (in which it is clearly distinct from *W. albomarginata*, which has a capsule in the form of an inverted cone). This, which has been called *W. saxicola* var. *congesta*, grows on the shingle beach near Greymouth and, strangely enough, on dunes along with *Gnaphalium trinerve* on the north shore of Foveaux Strait, although it is not a dune plant elsewhere.

Another New Zealand species, an annual, *W. gracilis* (at first called *Campanula gracilis*), has unfortunately been confused with other species, and this name is often wrongly used in gardens. It grows in New Zealand in the spaces between the tufts of strong grasses along with *Oxalis corniculata*, and *Hydrocotyle novaezealandica*, on cliffs and rocks, and among *Leptospermum scoparium*, and is again a very variable plant. It has usually slender stems up to 2 feet in height, but sometimes much dwarfer, with small blue, purplish, or white flowers in racemes, and is scarcely worth cultivation in comparison with *W. vincaeflora*, which is often grown under this name, no doubt because it was figured in the *Botanical Magazine*, t. 691, as *Campanula gracilis*. LINDLEY gives a figure in PAXTON'S *Flower Garden* (vol. ii, p. 13, fig. 142) of *W. vincaeflora*, and there is a good coloured plate of it also in *Revue Horticole*, 1849, p. 41, where DECAISNE first put the plant into its proper genus. Like *W. gracilis*, the stem is leafy on the lower part, and the stem for the most part is glabrous. The flowers are borne on stems from which two or three spring, up to 18 inches high, and are large, up to $1\frac{1}{2}$ inch in diameter, with a bell-shaped tube and spreading lobes, bright blue or white. The calyx lacks the dark lines usually found in *W. albomarginata* and *W. saxicola*. *W. vincaeflora* is Australian and Tasmanian, and perennial in its native home. Its closest New Zealand relative is *W. Matthewsii*, named by Dr. COCKAYNE in 1914 in honour of Mr. H. J. MATTHEWS, who discovered the plant in the Marlborough-Clarence Valley in South Island. It is distinguished from *W. vincaeflora* by its leaves being all and always linear (instead of sometimes spathulate), the stems purplish, arising close together from a woody root-stock, and by the beautiful pale lilac flowers. Its companions in New Zealand on dry limestone rocks are *Veronica Hulkeana*, *Olearia insignis*, and *Senecio Monroii*.

Two other species of *Wahlenbergia* occur in New Zealand, but so far as we are aware neither is in cultivation in this country. They are *W. flexilis*, described in 1916, found near *W. Matthewsii*, and *W. cartilaginea*, bearing a great resemblance to an encrusted Saxifrage, and occurring only in shingle beds in the South Island in the driest part: probably a plant not easy to accommodate in cultivation.

W. multicaulis, an Australian species, has been in cultivation in this country, and is figured as *Campanula capillaris* in LODDIGES' Botanical Cabinet, t. 1406, but so far as we know it is not now grown. It is a tall, slender plant with flowers about $\frac{1}{2}$ inch wide.

These tall, erect species seem to grow well in a well-drained soil in full sun, though they cannot be depended upon always, as can *W. hederacea*, to maintain themselves without the pains of sowing seed annually, but, as will be seen, most of them are worth the trouble.

W. Matthewsii seems better in a somewhat stiffer soil and cannot withstand prolonged drought.

With the exception of *W. hederacea*, the European species of *Wahlenbergia* are perennial tuft-forming species, with much of the growth habit of *W. serpyllifolia*, which is illustrated in the frontispiece.

The species in cultivation come for the most part from the Carpathian Mountains and from the mountains of Bosnia, Serbia, and Dalmatia. *W. serpyllifolia* is probably the best known and most widely grown.

The oval, shining leaves, hairy only at their margins, form little rosettes whence spring in June smooth, 5- or 6-inch red-purple stems, terminated by deep red buds that open out into bells of almost silken violet, lasting, alas! but too short a time. A seedling form arose at Ingleborough with flowers much larger than the type to which the name *W. serpyllifolia major* has been given, and there is also a variety known (*W. serpyllifolia pilosula*), but not common, with hairy leaves, otherwise like the type. *W. serpyllifolia* has been known by many names, of which *Campanula serpyllifolia* still persists.

The flowers of *W. serpyllifolia* lack the tooth found in some species between the lobes of the calyx, but it is always to be found in *W. pumilio*, another beautiful species from the limestone rocks of high Dalmatian hills, with close-set, pointed leaves glistening with silvery hairs. In early summer the warm-lavender flowers are produced on short stems near to the cushion in numbers sufficient to hide the foliage, bell-shaped, with their mouths upturned to the sky—a much more compact plant than *W. serpyllifolia*.

W. dinarica, which also shows the small, interlobar calyx teeth, is taller and looser in its growth, with longer leaves, less silvery and more bristly, and with less brilliant flowers of a purple tone, borne on longer stems, but smaller than those of *W. pumilio*. *W. pumiliorum* is another name for *W. dinarica*. *W. dinarica* is native in the Balkans and is perhaps most closely related to *W. serpyllifolia*.

Near the coasts of Dalmatia grows a *Wahlenbergia* with longish, linear leaves, downy beneath and rather bristly above, smooth or

somewhat toothed at the margin, and bearing its flowers in clusters on downy stems about 3 inches long with ovate-acuminate bracts beneath the flower heads. This is *W. graminifolia*, and in its best forms it produces brilliant purple and large bell-shaped flowers, but some of the varieties or sub-species are less to be desired, for they are coarser in habit or smaller in flower, or less brightly coloured. A great number of names have been given to the forms of this very variable plant, some, like *W. croatica* (with leaves only fringed with hair at the base), *W. caricina*, and *W. tenuiflora*, being sometimes given specific rank, and various varieties being described, such as *australis*, *sicula*, *pusilla*, and *elata*. *W. tenuiflora* is figured in the Botanical Magazine, t. 6482, with blue flowers white in the throat, and it is in cultivation under the name *Edraianthus tenuifolius*, while all the others mentioned above may be listed under the name *Edraianthus*.

W. caudata (*Edraianthus caudatus*), sometimes called *W. dalmatica* (*E. dalmaticus*) has violet-blue flowers and long, entire, acute leaves with bases clasping the almost hairless stem or grouped in a rosette at ground level. The leaves beneath the flower heads are only about one-third as long as the flowers themselves. *W. caudata* grows on sunny hills about Clissa and Salona in Dalmatia.

W. Kitaibelii, a plant of limestone rocks in the Carpathians, is also closely allied to *W. graminifolia*, but is distinguished by its bright green, not greyish, foliage. Its stems are purplish and softly hairy, the bracts acuminate like those of *W. graminifolia* and somewhat toothed, and the clustered flowers blue with a purplish tinge. It is figured in the Botanical Magazine, t. 6188.

W. serbica is another ally of *W. graminifolia*, often called *Edraianthus serbicus*, glabrous, and with clusters of purple flowers (which may or may not have the interlobar calycine teeth) on stems about 8 inches high, from niches in calcareous rocks in Serbia and Bulgaria.

W. nivea (*E. niveus*) was introduced in 1893, but it may not now be in cultivation. It is a white-flowered species, with its large flowers clustered at the ends of the stems, and with narrow, hairy foliage like the other species allied to *W. graminifolia*. The stem and bracts are purple and the calyx reddish, setting off the large snow-white corolla to great advantage. Like all white-flowered plants with reddish stems, the white of this is more solid than is seen in true albino forms from which the red colour is absent. It grows on limestone outcrops in the mountains of Bosnia, and it is greatly to be hoped it may soon be reintroduced.

The names of several other *Wahlenbergias* occur in literature, but so far none so well worth cultivation as those mentioned.

Mr. J. Wall, the superintendent of the rock garden at Wisley, finds the plants allied to *W. graminifolia* generally flourish in sunny, open places in the rock garden, provided the soil is good, deep, and thoroughly drained. If the soil has to be made up then a foot deep of a mixture of three parts of friable loam with two parts of limestone chips will suit. The soil below this special compost should be such

that the roots can penetrate it, for in addition to the fibrous surface roots these plants make stout roots that penetrate to a considerable depth. A top-dressing of limestone chips is an advantage. *W. serpyllifolia*, *W. dinarica*, and their allies are best accommodated in limestone scree, or on a sunny ledge in the rock garden, and are excellent in pans in the alpine house. For the latter, potting firmly in a compost of loam and leaf-soil with crushed stone and sharp sand is best, with, of course, careful watering, especially in winter.

All the species except *W. serpyllifolia* and *W. dinarica* are easily raised from seed, but *W. serpyllifolia* sets seed to a very small extent and is therefore best propagated by cuttings taken in July and rooted in the sand frame, and *W. dinarica* is best treated in the same way, as it is apt to cross freely with other species.

F. J. C.

THE MODERN HYBRID STREPTOCARPUS.

By CHARLES T. W. BEDBROOK, F.R.H.S.

THE modern *Streptocarpus* is one of the most beautiful of greenhouse perennials. The modern hybrids have been raised from *S. Rexii* and *S. Saundersii*, both South African species. Well cultivated, the new hybrids are magnificent in colour, form, and size, and it is difficult to imagine a more striking picture than a group of these plants well grown.

The colour of the flowers ranges through dark purple to violet, mauve, lavender and several shades of blue to the purest white, and includes many shades of pink, rose, salmon, red and even crimson. Apart from those with self colours there are many beautiful striped forms.

The flowers are borne in loose bunches on stout stems 8 to 10 inches high, with two to four blooms on each stem, and it is not uncommon with a good healthy plant to have fifteen or more flower-stems out at one time, giving a truly remarkable display of some fifty or sixty blooms on one plant. The flower stalks spring from the base of the velvety leaves, which sometimes grow to a length of 15 inches.

Streptocarpus can be had in bloom from the end of April to the end of October; indeed it is possible to have it in bloom nearly the whole year round, but it is hardly wise to let one's plants do this as it prevents them having the rest they need during the winter months and will affect their flowering abilities the following spring. A good plan is to remove any flower spikes that appear after, say, the middle or end of October at the latest, and to rest the plants until March, when they can be shaken out and repotted in fresh soil ready for flowering again. Young plants flowering for the first time in October should be allowed to throw up one or two flower spikes before pinching back, so that the colour of the flowers may be seen.

It is possible to increase one's stock of *Streptocarpus* by division of the roots or crowns when repotting in March, or by leaf cuttings, which should be placed in a close propagating frame in a temperature of about 65 degrees, where they will usually root readily. Experience, however, has shown me that plants raised from leaf cuttings soon deteriorate, and that the blooms are seldom up to the standard of the parent plant. The *Streptocarpus* is undoubtedly best raised from seeds sown in January or February. The seedlings will form nice young plants for blooming in the late summer and autumn of the same year. If it is desired to have the young seedlings in bloom in the spring then the seeds should be sown about the end of June or beginning of July. The young plants produced from these seeds will have made good progress by the time the cold weather comes, and if



the temperature does not fall much below 50 degrees during the winter months will keep moving steadily along. About April they should be ready for 5-inch pots, in which they will flower.

As the hybrid *Streptocarpus* does not always come true to colour when raised from seed, it is best to propagate any particular plant the grower may wish to increase by division of the roots.

The seeds should be sown very shallowly in well-drained pots or pans in a temperature of about 65 or 70 degrees, using a compost of equal parts of fibrous loam and leaf-mould which has been rubbed through a $\frac{1}{4}$ -inch sieve, with the addition of sharp sand. This compost should always be kept sufficiently moist. If the seed pans should become dry do not on any account water them from above unless a very fine spray or rose is used, as the seeds are so minute that they will easily be washed down the sides of the pans. A large number of failures in seed germination are directly attributable to this cause. If the pans or pots should become dry stand them up to their rims in water for a short time, carefully removing and placing them on the staging for drainage thereafter. Prick off the seedlings when quite small and grow on in single pots or in boxes about 2 inches apart in a fairly warm house to encourage healthy growth. For this potting a coarser compost of equal parts of loam, leaf-mould, peat, and a good proportion of sharp sand should be used. Keep the seedlings shaded until well established, when they should be placed on a shelf close to the glass. Assuming the seeds were sown in January or early February, they should be ready for 4-inch pots about the end of May, when they can then be arranged in a cool house or pit where the night temperature does not fall below 55 degrees or so. Keep the roots moist without much watering and shade from strong sunshine, at the same time admitting as much fresh air as possible. About June the young plants will be ready for their final potting, this time into 5- or 6-inch pots, in which they will flower. The soil now should consist of good fibrous loam, peat and leaf-mould, with some good coarse sand or mortar rubble added to assist drainage. The plants should on no account be potted up too firmly, and they should be shaded at all times from the strong sunshine. A few flower scapes will probably appear about this time, but these are best removed to encourage the building up of really good strong plants. The flowers should appear in abundance about August if the plants have been properly cared for in their early stages, and liquid cow manure should then be given about once a week, and a small quantity of approved fertilizer used with discretion. In experimenting I have found that a small quantity of common salt, about one half-teaspoonful to one gallon of water, given occasionally, produces a marked improvement in the growth of the plants.

Any special plants which the grower desires to keep for next season's flowering should be kept on the dry side during the winter, and repotted in March after the ball of soil around the roots has been reduced to a minimum.

The *Streptocarpus* succeeds best in a moist intermediate temperature, but it will do well in almost any greenhouse. If all the seed pods are removed as the flowers fall the period of flowering will be greatly lengthened and the size of the blooms maintained.

If a particular plant strikes the grower as being of better form, colour, and size than others of a batch, it should be carefully retained for seeding, and from the plants produced from these seeds a look-out should again be kept for a plant of more than average merit, and this should also be put aside for producing seeds. From the plants of this generation it should be possible to fix the seeds so that a large proportion of the plants reared in the future would be of the selected colour and form. The flowers pollinated should be marked in some way or other in order to make quite sure that the ovaries are not removed as soon as the flowers fall but are allowed to grow to maturity. The plants selected for seeding should always be kept quite apart from all others in the house, so that accidental crossing would not be possible. When transferring pollen from one flower to another for hybridizing, I find it best to use some steel instrument, such as an old blunt penknife, in preference to a camel-hair brush, as it is much easier to clean the blade of such an instrument than it is to purge the brush of every vestige of pollen.

THE STRAWBERRY.

By F. STREETER, F.R.H.S.

[Read June 21, 1932; Mr. R. D. TROTTER in the Chair.]

THE Strawberry does not appear to have been in cultivation until the Middle Ages, and only at the beginning of modern times has it been established as one of our most choice dessert fruits. Three species of *Fragaria* appear in the making of the English varieties now grown, viz. *F. vesca*, temperate Europe; *F. virginiana*, North America; and *F. chiloensis*, South America. From these races have been bred our present-day large fruit. It was in the early part of the last century that new varieties appeared, and during later years many have devoted much time to raising them, and many varieties have resulted.

Very fortunately the Strawberry will thrive on almost any soil, but the finest crops, both for size and flavour, that I have seen, were grown on the high land in Hampshire, on clay overlying chalk, and where the wild form covered the ground in acres.

I have proved to my satisfaction, times out of number, that to grow strawberries well the ground should be thoroughly trenched to a depth of 2 feet, and three layers of good manure added. Make quite sure that the bottom of each trench is broken up as deeply as possible so that the crop will not suffer from excessive moisture or drought. For the main crop it will be found advisable to provide at least three sites, the earliest on a south border, the main beds in the open garden, and the latest on a plot with either a north or east aspect. This is essential for the proper sequence of berries, which should at the very least extend over six weeks in a private garden. It is not advisable to keep the plants beyond two fruiting seasons, as the constitution becomes weak, and the crop is not then to be relied upon.

Before the year 1921 three years was usual, but never, I suppose, in all our history of fruit growing, was such a complete turnover from health to weakness experienced as was the case with the Strawberry; in fact, only by very careful selection and attention to detail can success be assured at the present time.

After the ground has settled from trenching, planting should be done as soon as the young plants are nicely rooted into sixty sized pots, from the beginning of August until mid-September being best. They will then root into the fresh soil and become quickly established. One thing must be remembered, and that is to see that the ball of soil never becomes dry, thus causing the young plants to suffer. Allow the plants 2 feet each way—this is plenty for present-day

planting, though years ago 3 feet was barely enough. In planting, only just cover the ball of soil and make the plant perfectly firm ; one often sees the plants 2 to 3 inches above the soil, but this is fatal to their health and good bearing. It is not advisable to grow any catch crop between the rows.

From the time planting is finished the ground should be constantly hoed and kept perfectly clean, all runners from the young plants being removed until the following season. Mulch with old mushroom dung in November after growth has finished for the year ; this should be lightly pricked into the soil in March and the plantation kept clean until the straw is placed very carefully under the plants to keep the fruit clean. There is now an excellent mat on the market used for this purpose. On small plantations long litter can be used, but if the weather prove very dry during the fruiting period this is liable to affect the fruit. The plants must never be allowed to suffer from want of water. If they flag during bright spells the flavour will be poor, but if trenching is properly carried out I have never known them to suffer from want of moisture. For the finest dessert fruit it is advisable to allow one strong truss of flower to develop on the young plant.

I know it is often advised to pick off all flowers the first season after planting, but this I do not think necessary. During the period of the first flowers opening, one must always be on the watch for a spell of frost, which will quickly blacken the earliest blooms, but a little dry straw lightly placed over each plant, or an inverted flower-pot, will often save the early berries. This should be removed each morning when danger of frost is past. When the crop is finished, remove the mulching and any dead foliage—the latter very carefully now. Previous to 1921 it was often possible to cut the foliage right off, leaving the plants to send up new growth, thus thoroughly cleaning the bed ; this is no longer advisable until we have regained that old rude strength.

There are several ways of protecting the fruit from birds, but if possible net over so that picking can be carried out in comfort. Place at each corner, and through the beds, fairly stout stakes well strutted ; on these nail some rough lathes or thin battens, to keep the whole rigid. The posts should stand 6 feet out of the ground if possible ; failing battens, wire or manilla three-ply cord may be used, but do not allow too great a distance between the bearers, otherwise there will be too much sagging. On this place some good fish-netting that has been netted on the square, and that has been used previously. New netting may contain deleterious substances.

Another system is to use benders, or net, about 12 inches above the plants ; this cannot be recommended, neither can the laying of nets on the plants direct, as these have to be removed every time the fruit is gathered, and heavy birds such as thrushes and blackbirds will settle on the net and peck the fruit through the mesh.

The best and general method of propagation is by young plants known as "runners"; these are produced in abundance from the parent plant, but care should be taken in selecting only the finest forms which give the best fruits. Any plant that is not up to the standard should be marked during the fruiting period and discarded. Only by these means can the Strawberry plantation prove profitable, and give satisfaction.

Fill the required number of 2-inch or 3-inch pots with the following compost: 3 parts medium loam, 1 part sand, 1 part decayed manure, and a 5-inch pot of soot to the barrow load; thoroughly mix, and fill the pots to within a quarter of an inch of the rim and make moderately firm, using no crocks. Secure the young plant on to the pot and keep in position with a short peg. Small stones are sometimes used until the roots are thoroughly established in the pot. Allow only one young plant to form, removing others that will form beyond the layered piece, thus giving all possible strength to the one plant. The earlier the young plants can be rooted the better, as they will form much stronger crowns. Plants sometimes have to be encouraged to throw runners by keeping the ground moist by watering. As soon as the plants are well rooted they should be severed from the parent, and left on the beds for two or three days before removing to the frame yard, where they should stand on a cold ash bottom. They should never be allowed to become dry at the root at any stage of growth, and may require water three times daily during dry periods.

Where it is intended to force the Strawberry, the earliest and strongest crowns should be selected. When they are taken from the bed and brought into the frame yard pot them into 6-inch pots well crocked with a good stopper, and about four other slightly smaller crocks, all carefully fitted; on these place a piece of turfy loam which has been hand-pulled, thus shaking out all the fine particles of soil; over this sprinkle old seasoned soot to keep out the worms. If the following compost can be prepared several months beforehand, and stored in an open shed, and kept covered, so much the better. Three parts good medium loam, one part well-decayed manure, one part finely crushed mortar rubble and sand, one 5-inch pot of bone meal, and one 5-inch pot of soot to the barrow-load. As no crocks were used in the smaller pots the plants can be potted on very firmly without any root disturbance; finish off just below the rim of the pot and see that the ball of soil is quite moist. Stand the pots close together, and keep sprayed twice a day during fine weather. As the plants become rooted through, they will gradually require more room in the full sun and air, and an onion bed from which the bulbs have just been taken is an excellent site. Stand them on narrow boards, and go over twice daily for water, and once a week just prick up the surface of the soil and remove any runners or dead leaves. On the approach of winter, when growth is finished, they should be removed to a good clean cold frame or pit, giving all the air possible. Should frames not be available they may be plunged in ashes right

IRIS HISTRIOIDES, G. P. BAKER'S VARIETY.

WE are indebted to Mr. E. A. BOWLES for the painting which is reproduced in illustration of this beautiful Iris, possibly the most satisfactory of the very early-flowering species for garden use.

Mr. G. P. BAKER tells us in the *Iris Year-Book* for 1931 (p. 63) that he has raised several thousand bulbs from the original stock of less than a dozen, obtained from Amasia in Asia Minor about twenty-four years ago. The plant grows there on the Armenian plateau, at an elevation of about 1,600 feet. Mr. BAKER's brother has also collected bulbs, on the route of the Baghdad railway in the upland country of Cilicia, which produced flowers similar to those depicted.

This Iris sometimes flowers in January out-of-doors, though often somewhat later, at about the same time as *I. sophenensis*, *I. Histrio*, and *I. tauri*, related plants, and earlier than *I. reticulata*; but, as will be seen, the leaves are then only just appearing out of the soil. No description of the flower is necessary, in view of the illustration which depicts it of natural size. As the foliage is so late in developing, it usually escapes the damage which *I. Histrio* suffers, and it is probably on this account that it is so much hardier. The temperature has, however, in all probability, another influence on the plant, for Mr. BAKER observes that when the plant first comes "into bloom the colours are of a bright blue with a violet hue, and that later on in the season, the succeeding flowers are paler." He also writes that in acid soil they are inclined to be of a deeper violet-blue. He found this character so marked when they first bloomed in his garden at Sevenoaks that in the second year he prepared a new bed for them and "gave the soil a good dose of mortar rubble." A good ordinary loam containing lime suits the plant well, provided the drainage is free, and there it multiplies rapidly by means of clusters of bulblets formed round the base of the parent bulb. It does not need annual lifting, as so many bulbs do, but may be permitted to remain undisturbed for several years.

F. J. C.

Iris histrioides
G.P. Baker's form



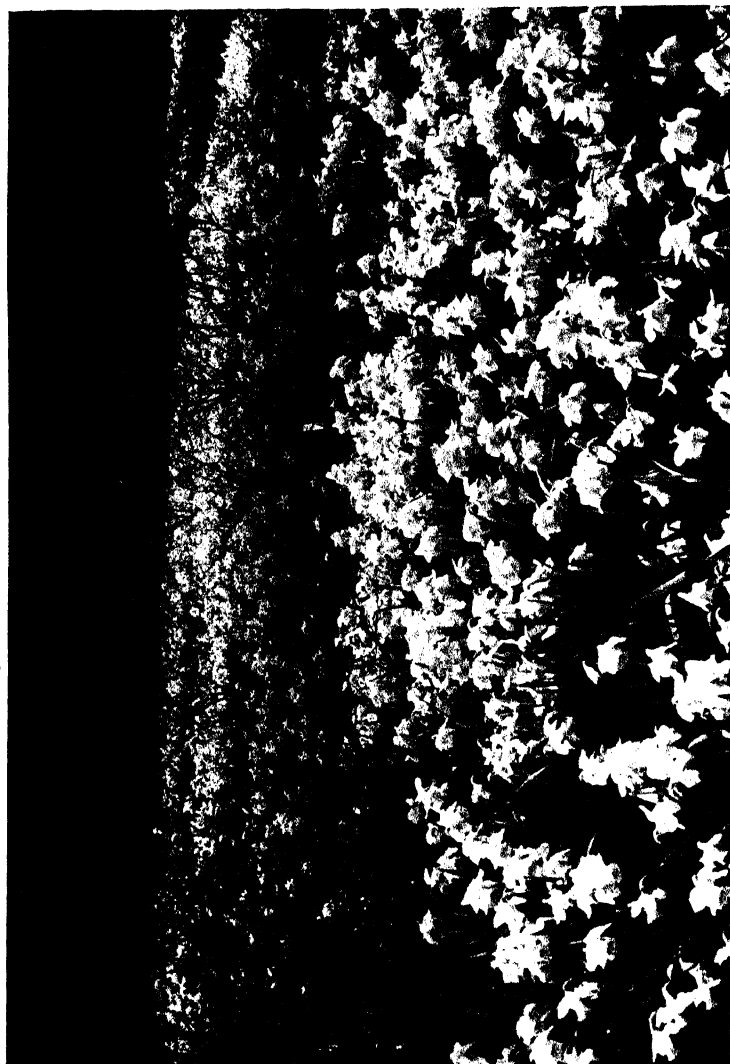


FIG. 2. DAFODILS AT WISLEY.

To face p. 17.

A MONOGRAPH OF NARCISSUS, SUBGENUS AJAX.

By H. W. PUGSLEY, B.A., F.L.S.

MORE than thirty years ago I began to cultivate Narcissi in my small garden, and in 1915 I wrote an account of the Poeticus group, which was published as a Supplement to the Journal of Botany for that year. In this work not only were wild forms dealt with, but attention was drawn to the existence of various plants that had evidently been very long under cultivation but whose origin was obscure ; and some of these were treated as provisional species. It is not clear even now just how far the arrangement then adopted is a natural one, for while wild Poet's Narcissi usually show a considerable range of floral variation, most of the old garden forms present a uniformity of flower that indicates an origin by bulb division from a small selected group of plants or even a single individual. And the omission to cite *exsiccata* in the taxonomic descriptions, though seemingly unfortunate, still appears to have been the only practical course, for the certain identification of dried specimens of Poet's Narcissi is impossible unless they are specially prepared and accompanied by particulars of the corona and the stamens.

In the Ajax group, which it is now attempted to revise, these difficulties are much less. There is not the same degree of floral variation among the wild plants of a single habitat, and it is not impossible to identify with some degree of confidence a large proportion of the specimens in herbaria. At the same time as wide an acquaintance as possible with the living plants, both wild and cultivated, is essential in this as in other groups of Petaloid Monocotyledons ; and it is with this in view that I have continuously grown in the garden a large proportion of the available wild Ajax forms. With them, as with the Poetici, fully developed capsules and occasionally perfect seeds can be obtained from flowers kept in water when, as often happens, fruiting fails in the growing plants. The wild form that I know best is, of course, the common English Daffodil. To see this plant flowering in thousands, lighting up meadows and open woods while the trees are yet leafless, is one of those pleasures that we all love to recall, as did our forefathers centuries ago. Another Daffodil that I have met with in profusion is *Narcissus abscissus*, decking steep grassy slopes in the Pyrenees, and on one occasion I saw it, in great beauty, growing mixed with an equal abundance of the dark bronze *Fritillaria pyrenaica*. I have also collected in the Pyrenees *N. nobilis* and a beautiful bicoloured form of *N. maculobus*. Another happy memory is that of *N. 'pallidus praecox'* in the Eastern Pyrenees in clumps under the pine-trees among the Primroses and white Hepaticas. In

the Italian Lakes district, too, I have seen wild Daffodils, and among them a full yellow form, allied to *N. obvallaris*, which will be described as a new species.

The herbarium material of Ajax forms available for examination is not extensive. There is a fair collection at Kew, as well as at the Natural History Museum, South Kensington, which now possesses the plants of the late M. GADECEAU, who was interested in Daffodils and copiously annotated his specimens. The BAILEY and MELVILL collections at Manchester also contain many useful sheets, and Mr. LACAITA'S Herbarium includes a few valuable gatherings. A small number of early examples in the LINDLEY Herbarium at Cambridge and the FIELDING Herbarium at Oxford are of importance for the identification of the species of the early nineteenth-century botanists. Whatever specimens HAWORTH may have preserved are no longer to be found.

Daffodils of the Herbalists.

Like the Poet's Narcissi, Daffodils were known in variety in cultivation before the end of the sixteenth century. Very generally they were credited with a Spanish origin, and "Spain" in this sense probably included Portugal. It seems remarkable that so many different forms should have been collected at such an early date, when travel was so difficult; and some of these early finds, like *N. cyclamineus*, have only recently been rediscovered, while others, as some of the Albiflori, have never since been traced. The former political connexion between Spain and the Netherlands, and the relations of the English Tudors with the Spanish Royal House, probably explain the explorations of Spain by foreigners at this period, of which the journey of CHARLES DE L'ECLUSE, or CLUSIUS, a native of Arras, which was then included in the Netherlands, is a well-known example. In the seventeenth century also there appear to have been very close connexions between England and Portugal. It must be remembered likewise that at this period Daffodils and other interesting and beautiful plants probably grew in relatively accessible localities from which they have since been extirpated either by collectors or the extension of local cultivation.

The earliest figure of a Daffodil in botanical literature is probably that of *Narcissus luteus* in BRUNFELS' Herbarum Eicones [vol. i. p. 129 (1530)], which shows a complete plant in bud, and a detached flower, erect with much expanded corona, that recalls *N. hispanicus*. In R. DODOENS' Histoire des Plantes, p. 150 (1557), which was translated from Low German into French by CLUSIUS, the name *Pseudo-Narcissus* (Coquelourde) appears for the first time, the plant being stated to grow about Bornhem, north of Brussels. Curiously the accompanying plate represents not a true Daffodil, but an *Incomparabilis* form resembling the modern 'Sir Watkin.' DODOENS' book was translated from French into English as A newe Herball by HENRY LYTE in 1578, and on p. 214 there is an account of the 'Bastard

Narcissus' with the same figure. In 1570 LOBEL's first work, *Stirpium Adversaria Nova*, was produced. It was printed in London and (p. 51) gives *Narcissus totus luteus montanus* Theophr., which is said to inhabit groves and woods of England and Belgium, and to grow near London. Six years later LOBEL's *Stirpium Historia* was published at Antwerp, and here the common Daffodil, as well as a double-flowered form, were illustrated with good figures. Two varieties are also mentioned which point to *N. hispanicus* and *N. minor*, and are the earliest records of these plants. The year 1576 is likewise the date of CLUSIUS' *Rariorum Stirpium per Hispaniam observatarum Historia*, in which (p. 255) another tall Daffodil with deep yellow flowers is recorded as growing in Old Castile. DODOENS' *Stirp. Hist. Pemptades Sex* (1583) reverts to the name *Narcissus* (p. 227) and gives *N. luteus sylvestris* as a plant of Belgium, Germany, and Spain. There are two figures, one copied from LOBEL and a second, with a larger flower and more expanded corona, that resembles *N. hispanicus*. The *Epitome* of J. CAMERARIUS (1586) has an interesting figure of *N. totus luteus* (p. 953), in which not only an opened and a double flower but a developed capsule and seeds are accurately depicted. This plate may also be seen in MATTHIOLI's *Kreuterbuch* (p. 442, as *N. IIII luteus*). The *Kreuterbuch* of HIERONYMUS TRAGUS (1587) shows (p. 271) a Daffodil with three flowers springing from a single bulb! In 1596 CASPAR BAUHIN's *Phytopinax* was published, in which three Daffodils are enumerated, and the following year the *Herball* of JOHN GERARD, which mentions the double Spanish Daffodil, the English wild Daffodil, and the Spanish single Daffodil grown in London gardens. There is much interesting information about these plants in CLUSIUS' *Rariorum Plantarum Historia* (1601), although it includes no additional species. We learn that CLUSIUS knew the first kind, *Pseudo-Narcissus vulgaris*, in his youth, while a student at Louvain; the second, *P. major hispanicus*, which is the plant of Old Castile, he illustrates by DODOENS' second figure; and the third, *P. minor hispanicus latifolius*, he describes in some detail and with an original plate. A further species, *Pseudo-Narcissus flore albo*, was introduced by CLUSIUS in his *Altera Appendix ad Historiam*, attached to the *Exoticorum Libri Decem* (1605). It was well figured and fully described by CLUSIUS as a remarkable Daffodil which he received with Cyclamens and other plants from the Pyrenees. This is the earliest known record of a white Daffodil. A slightly later work, P. VALLET's *Jardin du Roi Henri IV* (1608), is notable for its excellent figure of *N. cyclamineus*. In 1612 appeared J. T. DE BRY's *Florilegium Novum*, which shows three yellow-flowered species, of which two are probably described for the first time. The relative figures of these plants are well produced.

A further advance in the knowledge of the Daffodils may be seen in EMANUEL SWEERT's *Florilegium*, printed at Frankfort in 1612. Here two new Daffodils, evidently "clipt-trunks," are recognized in addition to the five kinds already definitely known. SWEERT'S

figures, though well printed, are crude and badly drawn, and occasionally indeterminable; for three of his species he uses the name *Pseudo-Narcissus*, for the remainder *Narcissus*. In 1613 a much more important work, BASIL BESLER'S *Hortus Eystettensis*, was published at Nuremberg. This ponderous tome gives an account of the plants cultivated in the Bishop's garden at Eichstadt in Bavaria, and furnishes short descriptions of every species, with synonyms, as well as life-size figures, which are generally well drawn and show complete plants. BESLER describes nine Daffodils, some of which he names *Pseudo-Narcissi*, and others *Narcissi*, without any obvious reason. SWEERT'S clipt-trunk forms are not included, but a bicolor is distinguished for the first time, and a further dwarf kind, which may be the *N. minimus* of modern gardeners. There are also two additional yellow Daffodils, one the *P. major hispanicus* of DE BRY, the other resembling *N. obvallaris*. Good figures of two of DE BRY'S plants may be found in C. VAN DE PASSE'S *Hortus Floridus* (1614).

In C. BAUHIN'S *Pinax* (1623), which brought together most of the accumulated botanical knowledge of that period but is without illustrations, eleven species of true Daffodils are included, all based on the plants of SWEERT or the *Hortus Eystettensis*. The species are: (1) *Narcissus subflavus tubo sexangulo*, (2) *N. flavus tubo rotundo*, (3) *N. albus calice flavo, moscari odore*, (4) *N. albus calice flavo alter*, (5) *N. sylvestris pallidus calice luteo*, (6) *N. major totus luteus calice praelongo*, (7) *N. totus luteus floris foliis reflexis*, (8) *N. parvus totus luteus*, (9) *N. albus oblongo calice*, (10) *N. albus fimbria lutea*, (11) *N. luteus repens*.

The next work that calls for notice is the *Paradisus* of JOHN PARKINSON (1629), which is of special interest as an account of the Daffodils then cultivated in England. The text gives some description of each form with its presumed place of origin, and PARKINSON mentions that several of his plants came from the Pyrenees. Most of the forms are figured, but the plates are poor. As a rule flowers only are shown, and these are badly drawn and printed. PARKINSON'S species number thirteen (excluding double-flowered forms) and differ materially from those of the *Pinax*. C. BAUHIN'S species marked 3, 4, 7, and 10 above, do not seem to have been known to PARKINSON, but he gives five fresh forms, viz. *Pseudo-Narcissus pyrenaicus variformis*, *P. pallidus praecox*, and three additional white-flowered Daffodils.

A second and enlarged edition of GERARD'S *Herball* was brought out in 1633 by THOMAS JOHNSON, but in this (p. 132) only the four species of CLUSIUS are distinguished and figured. The plates of the English Daffodil and of *P. albo flore* are both good. In the same year the anonymous *Theatrum Florae* appeared in Paris. This contains (Pl. 20) well drawn and engraved figures of six Daffodils, but does not include any forms that appear new. MATTHEW MERIAN'S *Florilegium renovatum* (1641) has two plates of Daffodils, the first (t. 15) showing three good figures reproduced from DE BRY'S work, and the second (t. 135) three much cruder but probably original figures, one of which perhaps represents the large white Daffodil

N. albescens. The Historia of JOHN BAUHIN, published at Briançon in 1651 though written many years earlier, gives (vol. ii. pp. 593-597) good accounts with figures of the three species of CLUSIUS' Historia under the names of *Bulbocodium vulgatus*, *B. hispanicum*, and *B. minus*, and of the *Pseudo-Narcissus albo flore* of CLUSIUS' Appendix under the original name. RAY [Historia, vol. ii. pp. 1130-1131 (1688)] mentions five species of Daffodils, four being those introduced by CLUSIUS and the fifth the plant now known as *N. bicolor*, which is for the first time unmistakably distinguished.

We now come to the Campi Elysii of O. RUDBECK (1701), the joint work of the father and son of that name, which is of particular interest owing to its authors being predecessors of LINNAEUS at Upsala. The book is a rare one, but LINNAEUS' own copy is preserved in the Linnean Society's library at Burlington House. The species enumerated by RUDBECK are without descriptions and are based on synonyms taken mainly from SWEERT, BESLER, or CLUSIUS. They are all figured in plates of unequal merit, some of the figures being annotated as drawn from plants in the Upsala garden. The number of species, all shown under the name of Narcissus, is eighteen, whereof two appear to be Corbularias. With one exception (*N. major luteus calice praelongo alter*) all of the plants seem to have been previously distinguished.

BARRELIER's *Plantae per Galliam, Hispaniam et Italiam observatae*, published at Paris in 1714, includes figures of fourteen different Daffodils. The figures are well produced, but no information respecting the plants is furnished except their names, which are original. No fewer than eight of these Daffodils are white-flowered forms.

There is some interesting information in HILL's *Eden* (1757) respecting this group of plants, with a good account of a form termed the "fringed Narcissus" (p. 184). Directions are given for raising Daffodils from seed, and it is mentioned that they normally require five years to bloom. There is evidence, however, nearly a century earlier that these plants were sometimes raised from seed.

Daffodils from the Time of Linnaeus.

LINNAEUS, as might be expected, paid no special attention to this group of plants, and since his time comparatively few botanists have studied them intensively. It is almost exclusively in Britain that they have at certain periods excited interest, and that more from a horticultural than a botanical standpoint. In *Species Plantarum*, p. 289 (1753), LINNAEUS admitted one species only, *N. Pseudo-Narcissus*, and his whole genus Narcissus contained but six species. In the second edition of the *Species Plantarum* (pp. 449 *seq.*) three additional Daffodils were included, viz. *N. bicolor*, *N. minor*, and *N. moschatius*, but it is clear from the confusion of the synonyms cited by LINNAEUS under two of them that his knowledge of the group was only very general. Fortunately the three later species are represented by determinable specimens in his herbarium.

Dean HERBERT's contribution to the taxonomic study of these plants is his account in the Amaryllidaceae, pp. 299 *seq.* (1837), where he rightly reduces the number of HAWORTH's genera while maintaining Ajax for the Daffodils. The number of his species is nine, viz. *A. minor*, with six varieties; *A. Pseudo-Narcissus*, with four varieties; *A. bicolor*, with three varieties; *A. tubaeiflorus*, with two varieties; *A. moschatus*, with four varieties; *A. luteus*, with four varieties; *A. abscissus*; *A. hexangularis*; and *A. Sabinianus*. The last of these appears to be an *Incomparabilis* hybrid. In a "Postscript" (p. 415) HERBERT changes his views respecting some of these plants and raises some of the varieties to species. It is evident from his account that his knowledge of the group was inferior to that of SALISBURY and HAWORTH. His method of describing is original and peculiar, and I have found his diagnoses difficult to understand and of comparatively little value. His reference (under *A. hexangularis*) to the absurdity of the existence of a plant like *N. cyclamineus* is almost too well known to be recalled.

There is a comprehensive account of these plants, based on HAWORTH's *Revisio*, but under the generic name *Narcissus*, in ROEMER and SCHULTES' *Systema Vegetabilium*, ed. 16, vol. vii. (1830), and a later summary in ROEMER's *Synopses Monographicae*, fasc. iv. *Ensatae* (1847), where much of the knowledge of the group to date is brought together. A similar compilation, but founded on HERBERT's work, may be found in KUNTH's *Enumeratio Plantarum*, vol. v. (1850).

Three contemporary descriptions in SWEET's *British Flower Garden*, Ser. II, vol. ii. (1833), are worthy of mention owing to the beauty of the accompanying plates. They are *A. cernuus* (No. 101), *A. pumilus* (No. 143), and *A. albicans* (No. 145). The same volume contains equally good figures of *Narcissus recurvus* and *N. stellaris*. The well-known and much earlier *Liliacées* of REDOUTÉ has three plates of Daffodils, viz. *N. Pseudo-Narcissus* (vol. iii. No. 158), *N. candidissimus* (vol. iv. No. 188), and *N. minor* (vol. viii. No. 480). These plates, like all of REDOUTÉ's, are beautifully produced, but the figures in each case are conventional rather than botanically accurate. An excellent French figure is that of *N. minor* in the third volume of the *Herbier général de l'Amateur*, by MORDANT DE LAUNAY (1819).

An interesting diagnostic character that had hitherto been overlooked was brought to notice in Bull. Soc. Bot. France, vol. vii. p. 308 (1860), by M. J. GAY, who discovered that the seed of a late-flowering Pyrenean Daffodil cultivated in France (*A. muticus*) lacked the vesicular appendage at the chalazal end which characterizes other species. There are seeds in which this feature can still be seen among GAY's specimens at Kew.

In 1875 BURBIDGE and BAKER's *The Narcissus* was published. The Daffodils in this work are all included in one species, *N. Pseudo-Narcissus* L., and the botanical account of them occupies just two pages. Four varieties are admitted, *major* L. Sp. Pl. p. 415 (*sic*),

minor, *bicolor*, and *moschatus*, with the same authority cited. The descriptions are of a very general character, but many of the species of HAWORTH and his contemporaries are referred to the four recognized varieties. The work is illustrated with a number of coloured plates, but the figures are roughly drawn and crudely tinted, and compare very unfavourably with many earlier illustrations.

The treatment of the group was considerably modified in BAKER's *Amaryllideae* (1888). One species only (*N. Pseudo-Narcissus*) was still recognized, with a variety *Johnstoni*; and six subspecies—*N. muticus* Gay, *N. cyclamineus*, *N. major* Curt., *N. minor* L., *N. bicolor* L., and *N. moschatus* L.—are appended. There is a copious synonymy, mainly post-Linnean.

The last revival in the cultivation of Daffodils, headed by PETER BARR, led to the production of an interesting list of forms in *The Florist and Pomologist*, p. 91 (1884). This list included a large number of plants which BARR had collected, chiefly in cultivation in Britain, and had identified with the species described by HAWORTH, SALISBURY, and HERBERT. In all thirty-eight plants are enumerated, arranged under eight species: *N. Pseudo-Narcissus*, *N. abscissus*, *N. cambricus*, *N. major*, *N. minor*, *N. bicolor*, *N. lorifolius*, and *N. moschatus*. It is of interest to note that two of these plants, marked by BARR as lost to cultivation, have since been rediscovered.

The third volume of ALEXIS JORDAN's *Icones ad Floram Europae*, published in 1903, many years after the author's death, contains descriptions of thirteen species of Daffodils, twelve of them new. The descriptions are in detail and uniformly well written under the generic name *Ajax*, and the origin of each plant is given. There is a full-page plate of each species, showing at least one complete plant, and dissections of the flowers and fruits are added. These are perhaps the best illustrations of Daffodils in any botanical work. Three of the species are described from garden plants, nine are natives of various parts of France, and one is a native of Northern Spain. This last-named is *A. asturiensis*, the *N. minimus* of present-day English gardeners. The majority of the species, several of which closely resemble *N. Pseudo-Narcissus*, are "Jordanian" species, and most of them have been reduced to the rank of varieties in the present revision.

The arrangement of the Daffodils in the two leading Floras of Spain and France, the countries in which the plants are chiefly found, should perhaps be mentioned. In WILLKOMM and LANGE's *Flora Hispanica*, vol. i. pp. 151 *seq.* (1861), *Ajax* is treated as a section of *Narcissus*, and the following species are admitted: *N. minor* L., with a variety *cuneiflorus* (Salisb.); *N. Pseudo-Narcissus* L., with a variety *bicolor* Gren. Godr.; *N. major* Curt.; *N. moschatus* L.; and *N. tortuosus* Haw. It is probable from the description that the plant intended as *N. minor* is really *A. asturiensis* Jordan.

ROUY's *Flore de France*, vol. xiii. pp. 28 *seq.* (1912), treats *Ajax* as a subgenus of *Narcissus*, and includes all the French forms under

one species, *N. Pseudo-Narcissus* L., which is divided into two subspecies, *N. silvestris* Lamk. and *N. moschatus* L. The first subspecies has a variety *serratus* (*N. serratus* Haw.), and four races: (1) *N. major* L. (*sic*), subdivided into α *hispanicus* (*N. hispanicus* Gouan) and β *maximus* (*A. maximus* Haw.); (2) *N. bicolor* L.; (3) *N. minor* L.; and (4) *N. candidissimus* Red. The second subspecies is represented by two races: (1) *N. muticus* Baker; and (2) *N. lorifolius* R. & Sch., with varieties β *anceps* Schultes and γ *discolor* (*N. bicolor* Lap.). The separation of *N. moschatus* from *N. candidissimus*, to cover two races *N. muticus* and *N. lorifolius*, is an unusual and apparently unnatural arrangement, and at once raises the question whether there is any evidence of a white-flowered Daffodil lacking the chalazal seed appendage. GAY seems to have known this peculiarity only in his *A. muticus*. ROUY makes no allusion to the species of JORDAN's *Icones*.

Taxonomic and Morphological Characters.

In considering the classification of Daffodils the question that naturally first arises is the position of the group in relation to other Narcissi. The feature that immediately strikes every observer is the large and conspicuous corona, but an equally essential and perhaps really more important character lies in the arrangement of the stamens. These are uniseriate, while in other Narcissi they are biseriate, and they are inserted near the base of the perianth-tube, to which they are adnate for a very short distance, rarely exceeding 5 mm. The anthers are linear and stand erect round the style, than which they are always shorter; and the point of attachment to the filaments is not at the middle of the anthers, as in other Narcissi, but at a very short distance from one end, so that they become sub-basifixed instead of versatile. The unique flower of the Daffodil was observed at a very early date, and apparently led DODOENS [Hist. Plantarum, p. 150 (1557)] to invent the designation *Pseudo-Narcissus*, a term that was consistently used by CLUSIUS, GERARD, and PARKINSON. In later times SALISBURY founded the genus *Ajax* for these plants, and he was followed by HAWORTH, HERBERT, and SWEET, and more recently by JORDAN. In BURBIDGE and BAKER's *Narcissus*, where all the forms are united as a single species, *N. Pseudo-Narcissus* L., this is placed with the genera *Corbularia* Haw. and *Assaracus* Haw. to form a group *Magni-Coronati*. This is not only an extreme Benthamian method, but an unnatural one, for *Assaracus* (*N. calathinus*) is obviously more closely allied to *N. triandrus*, which is included in another group *Medio-Coronati*, than to either *N. Pseudo-Narcissus* or *N. Corbularia*. It has already been remarked that WILLKOMM and LANGE in the *Flora Hispanica* treat *Ajax* as a section of *Narcissus*, and that in ROUY's *Flore de France* it appears as a subgenus. I am inclined to think that the distinguishing characters of *Ajax* are as important as those of some other genera of Petaloid Monocotyledons, but at the same time I suspect that some of these genera ought to be reduced,

and so, with my limited experience in dealing with genera, I take the middle course and follow ROUY in regarding the Daffodils as forming a subgenus *Ajax* of *Narcissus*.

The best attempt to subdivide the subgenus *Ajax* seems to be that of HAWORTH'S Monograph, which has been shown above. This requires some emendation. The genus *Oileus* certainly cannot stand, for its one undoubted member is a true Daffodil allied to *N. bicolor*. *N. cyclamineus* and *N. Johnstonii*, neither of which was actually known to HAWORTH, are widely different from all the other forms in their concolorous flowers and more or less reflexed perianth-segments, and therefore are readily separable as a distinct section. Of the remaining plants, forming a second and much larger section, HAWORTH'S *Minores* and *Albiflorae* are homogeneous groups when *N. cyclamineus* is transferred; and similarly his *Pallidiflores* with the removal of *N. nanus*. His last group, *Lutei*, comprises more varied species, and it seems best to restrict this name to the deep yellow-flowered forms only (*Lobato-coronae* and *Incisilobae* Haw.) and to divide the remaining species (*Serricoronae* Haw.) into *Vulgares* for *N. Pseudo-Narcissus* and kindred forms, and *Nobiles* for certain somewhat similar plants of taller growth with large and showy flowers, of which one only was known to HAWORTH.

The most difficult matter in this, as in many other genera, is to determine what forms should be regarded as of specific rank. HAWORTH sometimes made a new species of a flower that attracted his notice in the London Flower Market; JORDAN, meeting with a Daffodil in which he detected features that he had not previously observed, wrote a careful description of the entire plant and figured it under a new specific name. It is evident that such methods, if generally followed with sufficient assiduity, would result in an accumulation of species that would render taxonomy practically impossible. Resemblances must be considered as well as differences, and an attempt made to estimate the relative importance of different characters. The subgenus *Ajax* is clearly one of the very many polymorphic groups of plants. A number of its most distinct forms are old garden plants whose origin is not certain. It is known that Daffodils were raised from seed in the seventeenth century, but this was probably rarely practised, for the length of time that would necessarily elapse before the flowering of the seedlings would always act as a strong deterrent. Cross-pollination was not understood until the nineteenth century, so that it cannot be supposed that these old forms were artificially created hybrids. It thus seems much more likely that they were all originally wild plants imported into the garden than that they were garden hybrids that could only be accidental. Some of these old garden plants have been refound in a wild state, and it may be assumed with reason that others that are not known in natural habitats are of similar status.

Wild *Narcissi* are gregarious plants that often grow in enormous numbers, and it is well known that in nature species of different

generic sections, if growing in proximity, will occasionally produce hybrids. It is therefore probable that different forms of Ajax in like conditions will act similarly and perhaps more freely so. My experience here is too limited to be of much value, but I expect that different wild Daffodils only occasionally grow together. In the Pyrenees, however, *N. pallidus praecox* and *variformis* are said to be found in proximity, and I once saw three distinct Daffodils within a single mile above Luchon. When Ajax forms do grow intermingled, it is likely not only that they cross freely, but that the offspring again hybridize with one or both parents, so that a number of intermediate forms may be found and the whole community has the aspect of a variable form ranging from one parent to the other. Wild collected plants, I believe, occasionally have this aspect, and the Daffodils grown on the mound at Kew, which I think are largely imported wild plants, comprise a number of intermediate forms. It is further possible that homogeneous communities of wild plants showing intermediate features are really of hybrid origin.

In attempting to classify these plants, I have tried to distinguish forms whose main characters appear distinct and not intermediate, and to treat only such plants as species, bearing in mind at the same time the probabilities arising from their geographical distribution. In accordance with this treatment eight new species will be established in this paper, five forms bearing deep yellow flowers, one with straw-coloured and one with white flowers, and one a splendid bicoloured plant recently collected for Mr. LACAITA. It will no doubt be noticed that among the species admitted all are not equally distinct, and it is possible that some of them might well have been treated as subspecies or varieties. But to assess accurately the status of all the known forms would involve a much more extensive knowledge of the wild plants in their native habitats than is at present possible, and it is therefore thought best to give specific rank to all plants appearing to possess distinct and not intermediate characters of apparently more than varietal value.

Among Daffodils most of the organs of the plant are of some importance for furnishing taxonomic characters, and their salient features can now be noticed seriatim.

There is little in the bulb to furnish diagnostic features. The chief difference is in size, the smallest bulbs being those of *N. asturiensis* and the largest those of *N. bicolor*. Under cultivation bulbs frequently become abnormally large. The small bulbs and those of the pale-flowered species are normally whitish in colour, the others more or less brown. Some bulbs are said to be more globose than others, but this is not very obvious.

The foliage presents considerable differences. It is always channelled at the base, generally becoming flat above. In *N. minor* and some other small species the leaves are more or less spreading, but in most forms they are nearly erect or recurved only towards the apex. In *N. hispanicus* and some other forms they tend to become

spirally twisted. Their breadth varies from about 2 mm. in *N. asturiensis* to 20 mm. in *N. bicolor*. The leaf-apex, though always obtuse, is more or less attenuate except in *N. asturiensis* and the broad-leaved forms. Most species have more or less glaucous foliage, this feature being most marked in the *Albiflori*, but in *N. cyclamineus* the leaves are bright green.

The scape is compressed and ancipitous except in *N. cyclamineus* and *N. asturiensis*, where it is nearly terete. The degree of compression varies considerably in different species. In some forms the scape is almost smooth, while in others, as *N. pallidiflorus*, it is ribbed or coarsely striate.

The one-valved spathe is normally membranous, but in *N. asturiensis* and some other species it is sometimes sub-herbaceous. "Spatha virens" is given by LINNAEUS as a character of *N. minor*. There are curious forms of *N. Pseudo-Narcissus* in which the margins of the membranous spathe are green and fully herbaceous; and this state may occur in other species.

The pedicel is one of the most important organs for the determination of species, both in its curvature and its length. While in the bud stage within the spathe it is always nearly erect upon the scape. As the flower opens it changes its direction and assumes a characteristic position in different species. Sometimes it becomes curved only at the apex, so that the flower is suberect, as in *N. hispanicus*; sometimes it is wholly and strongly arcuate-recurved with the flower drooping or inverted, as in *N. alpestris*; and sometimes without a regular curvature it is abruptly deflexed, as in *N. pallidiflorus*. After flowering and as the fruit develops, the pedicel usually resumes a more or less erect position. It may be as little as 3 mm. in length in *N. Pseudo-Narcissus*, and may exceed 90 mm. in *N. longispathus*.

The flower naturally affords some of the principal criteria. Its size is most variable, the length from the base of the perianth-tube to the edge of the corona ranging from 20 mm. in *N. asturiensis* to 80 mm. in *N. leonensis*. While absolutely self-coloured in the section *Cyclaminopsis*, in *Pseudo-Narcissus* it is more or less bicoloured (occasionally very obscurely so) except in the white *N. alpestris*. The proportionate length of the perianth-tube to the corona is an important feature. The tube is sometimes, as in *N. minor*, nearly as long as the corona; in the *Bicolores* it is about a quarter as long, and in *N. cyclamineus* even less. The shape, direction, and curvature of the perianth-segments are also characteristic, but in weak or ill-grown plants these features are obscured, the segments in all species tending to become narrow and straight. The form of the corona, its marginal expansion or reflexion, and its lobing, toothing, or undulation, are also salient features in distinguishing species. Scent is doubtless another characteristic, but it appears to be at times of a rather transient nature.

Specific characters may be seen in the stamens, especially in the extent to which the filaments are adnate to the perianth-tube. In *N. asturiensis* and *N. bicolor* the filaments are free almost to the base;

in *N. leonensis* they are adnate for about 7 mm. The anthers and pollen are usually sulphur-coloured, but in some of the *Albiflora* they are of a deeper yellow, which contrasts sharply with the whitish flowers.

The style always exceeds the stamens in length and falls short of the corona. It seems rarely to afford any clear diagnostic characters. The stigma varies somewhat in lobing, being generally more deeply 3-cleft in the *Albiflora* than in the other forms.

The capsule (figs. 3, 4, 5) varies greatly in shape. With each cultivated form it seems to be nearly uniform, but among wild plants of *N. Pseudo-Narcissus* a considerable diversity may be seen, the commonest form being trigonous-obovoid, shading into globose or oblong-ellipsoid. The fruits of the *Minores* tend to be oval and nearly terete; the *Lutei* generally possess large, oblong, or oblong-obovate, more or less trigonous fruits; the *Albiflora* have more ellipsoid, occasionally quite narrow capsules; in *N. bicolor* the fruit is nearly terete and strongly furrowed. The developed fruit of the common Daffodil is often wrinkled or rugose instead of smooth—a peculiarity, noted by HAWORTH and HERBERT, that has been observed only in one other species.

The chief diagnostic feature to be found in the seed is the presence or absence of the vesicular chalazal appendage first noticed by GAY. In the case of some species it has not been practicable to obtain ripe seeds to determine this feature.

The cytology of numerous forms of Daffodils has lately been investigated, and the chromosome numbers are given in the descriptions of the species that are known to have been tested.

A feature that must be mentioned, albeit of little taxonomic importance, is the frequent production of double flowers in some species. A double Daffodil was figured by LOBEL [Stirp. Hist., p. 61 (1576)], and ten years later by CAMERARIUS (Epitome, p. 953); and GERARD (Herball, p. 115) states that the double Spanish form was received here from France. CLUSIUS (Rar. Plant. Hist., vol. ii. p. 164) notes that the double Daffodil was grown in the Netherlands. A little later several of these double flowers were cultivated in England, for PARKINSON (Paradisus, p. 102) enumerates no fewer than six of them. LINNAEUS in Sp. Plant., ed. 2, p. 414, shows two double varieties under *N. Pseudo-Narcissus*, viz. β *N. sylvestris multiplex*, *calice carens* Bauh. Pin. 54, and γ *N. luteus sylvestris, duplici f. triplici tubo aureo* Bauh. Pin. 54; and the species is represented in his herbarium by a double flower apparently referable to var. β . At a later date HAWORTH was interested in these double-flowering forms, of which six are given in his Monograph. In 1900 eight forms were grown by Messrs. BARR, and some of these are still obtainable.

With the exception of the double Spanish form mentioned by GERARD and presumably that figured by LOBEL, the double-flowered Daffodils seem to have been relatively scarce plants that were much prized by gardeners. The most widely spread species, *N. Pseudo-*

Narcissus, rarely produces double flowers, and the phenomenon of doubling appears chiefly to characterize the species of the series *Lutei*. The common double Daffodil of English gardens probably belongs to this group, but, curiously enough, its identity has never been satisfactorily established. HAWORTH at different dates referred it to *N. Telamoni*us, *N. major*, and *N. lobularis*. Near Tenby *N. obvallaris* at the present day shows a strong tendency to doubling; and about Lugano the single yellow Daffodil of the hilly meadows is very much scarcer than a double-flowered plant that is probably only a form of it. In Italy generally double flowers of the deep yellow forms are said to be very frequent. On the other hand, double flowers appear to be rare in Spain, where the plants are most abundant; and the prevalence of double flowers in any district may perhaps indicate that the plant is not a true native but an introduction or relic of former cultivation.

Daffodils also exhibit differences less of a morphological than a physiological nature. Most of them are very susceptible to soil and other conditions of growth. It is well known that the common Lent Lily dies out in most English gardens. In the London clay of my small plot it always disappears forthwith. I find it impossible, too, to keep any species of the *Lutei* group or their derivatives, either in the border or in grass. On the other hand, the *Bicolor* forms flourish exceedingly. The *Albiflori* also die out with me, except the modern hybrid 'Madame de Graaf,' which is probably crossed with a *Bicolor*. In grass *N. 'pallidus praecox'* (both *N. pallidiflorus* v. *intermedius* and *N. maculobus* v. *pallidiflorus*) persists and always flowers, but it never increases by bulb division. More typical forms of *N. maculobus* brought from the Pyrenees in 1925 seem to behave very similarly, as do also forms of *N. nobilis*. *N. Gayi* increases quickly in my grass by bulb division but flowers very sparingly. As with garden forms so with wild Daffodils some species probably increase much more readily than others by bulb division. In Britain *N. Pseudo-Narcissus* spreads rapidly in this way, and this habit may have been induced by the constant gathering of the flowers over a long period, so that the plants have rarely been able to develop seeds. In most cases, probably, wild Daffodils seed quite freely.

Distribution of the Group.

The geographical range of the subgenus *Ajax* extends from the Iberian Peninsula, which is clearly its headquarters, over the whole of France to England, Belgium, Germany west of the Rhine, Switzerland, Tyrol, and Italy. Beyond these limits it is probable that only naturalized plants occur. The status of some Italian plants is uncertain, and, from the prevalence of double flowers in that country, it may be inferred that they are perhaps relics of ancient cultivation. Of the 27 species admitted in this paper, 12 are confined as native plants to Spain and Portugal, 1 to France, 5 to France and Spain,

1 to Italy, and 1 (*N. Pseudo-Narcissus*) is found throughout the range of the group. The remaining 7 are of unknown or doubtful origin.

It is evident that it is chiefly in Spain that the unlocated species must be sought, and it is likely that eventually not only these but other at present unknown forms will be discovered. Spain is an extensive country, almost entirely mountainous, where travel away from the beaten tracks is difficult and uncomfortable even in these days. BARR traversed the northern range of mountains and Northern Portugal, and made some interesting discoveries, to which FRÈRE SENNEN and a few others have contributed some additions. But so far as Daffodils—and indeed some other critical groups of plants—are concerned, Spain is still very largely an unexplored country, where different forms may be found from the Pyrenees and Galicia to the Sierra Nevada in the extreme south. Fragmentary examples of some doubtful forms have been received this year (1932) in the Herbarium of the British Museum from the Sierra de la Nieve in Andalusia.

From the abundance of wild Daffodils in the north of the Iberian Peninsula, their occurrence as native plants in Southern Ireland would not be surprising, but the best Irish botanists agree that no truly wild Daffodils exist in their country. It curiously happens, however, that a number of forms not known elsewhere were discovered by BARR and others in old Irish gardens in the latter part of the last century. Their origin is quite unknown, and it can only be assumed that they were introduced from Spain through the early herbalists, unless some new facts as to the possible nativity of some of them can be adduced.

The majority of the Daffodils are gregarious plants which inhabit bare slopes or grassy, park-like land about the woods of hilly or mountainous districts. In Britain *N. Pseudo-Narcissus* is frequently a true woodland plant. Occasionally Daffodils grow in swampy ground, and on one occasion in the Pyrenees I met with plants in such wet soil that they could be drawn out with the roots almost intact. In Spain and Portugal, as well as in the Pyrenees, they ascend to about 7,000 feet altitude, and the small species of the series *Minores*, which are apparently confined to more open ground, perhaps reach even greater heights.

In the Portuguese lowlands flowering begins in January or February, and on the mountains it continues till June, although in our gardens the latest-blooming species are over early in May. While many forms appear to be very regular in their time of flowering, others differ widely under different conditions.

NOTABILIA.

In the following taxonomic account a separate pre-Linnean synonymy has been inserted, as in "*Narcissus Poeticus* and its allies," owing to the importance in this group of the work of early writers. Some early figures are also shown among the *Icones*, and it has fortunately been found possible to cite *Exsiccata* almost throughout. Italicized salient contrasting characters are uniformly given in the succeeding descriptions, which have been drawn up from living

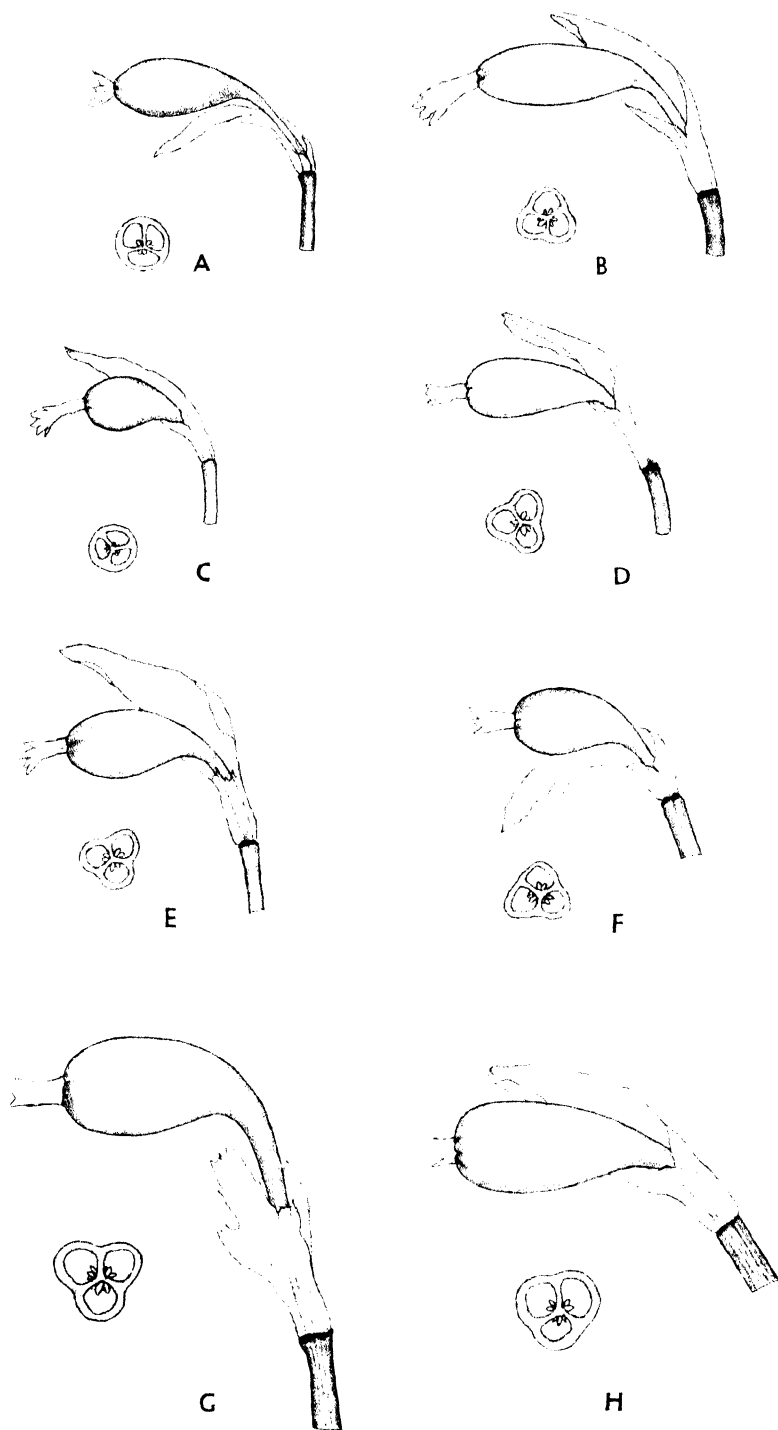


FIG. 3.—FRUITS OF NARCISSI WITH TRANSVERSE SECTIONS (nat. size).
 A, *N. cyclamineus*. B, *N. Johnstonii*. C, *N. asturiensis*. D, *N. minor*.
 E, *N. pumilus*. F, *N. nanus*. G, *N. hispanicus*. H, *N. obvallaris*.

[To face p. 32.

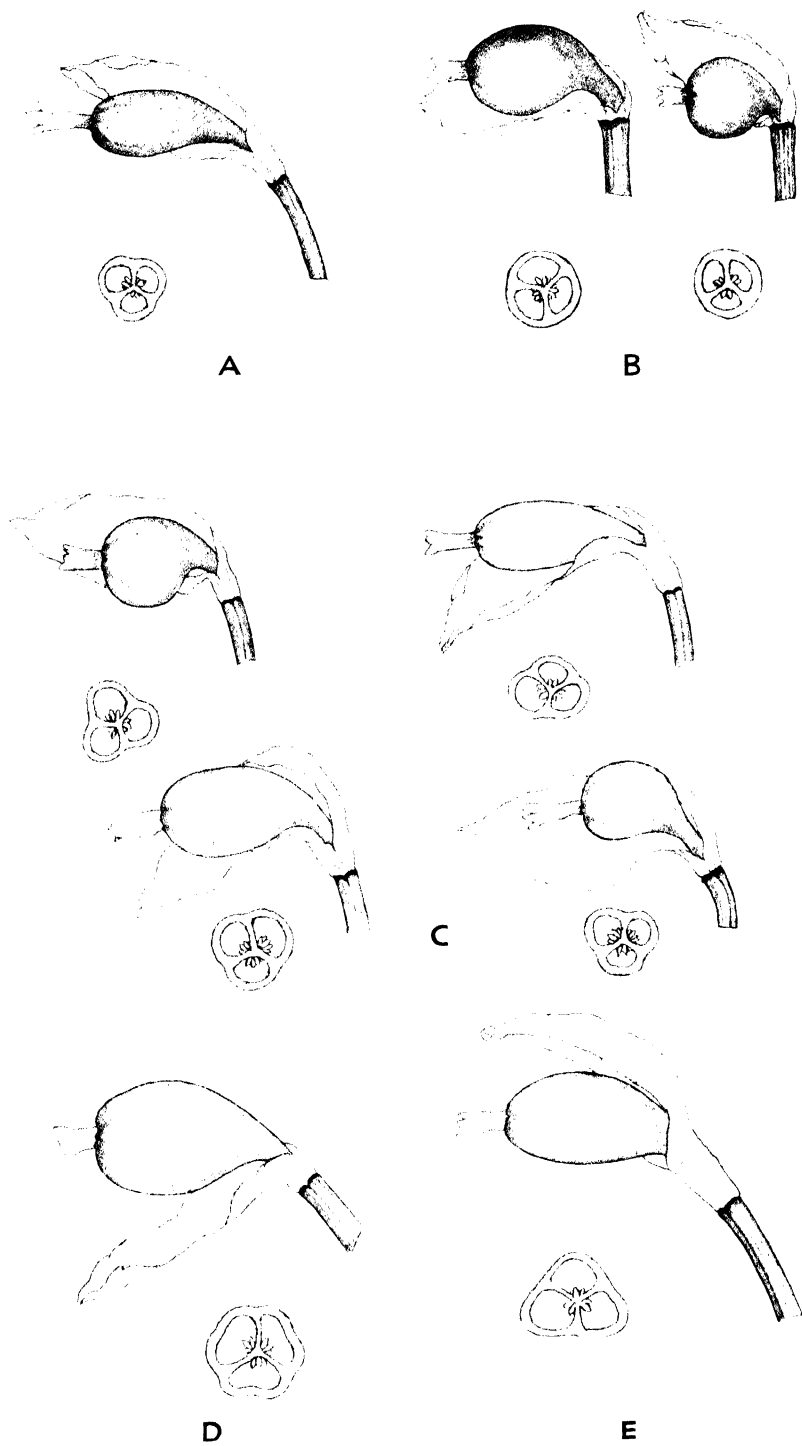


FIG. 4. —FRUITS OF NARCISSI WITH TRANSVERSE SECTIONS (nat. size).
 A, *N. pisanus*. B, *N. pallidiflorus* and var. *intermedius*. C, *N. Pseudo-Narcissus* (4).
 D, *N. maculobus* var. *pallescens*. E, *N. Gayi* f. 'princeps.'

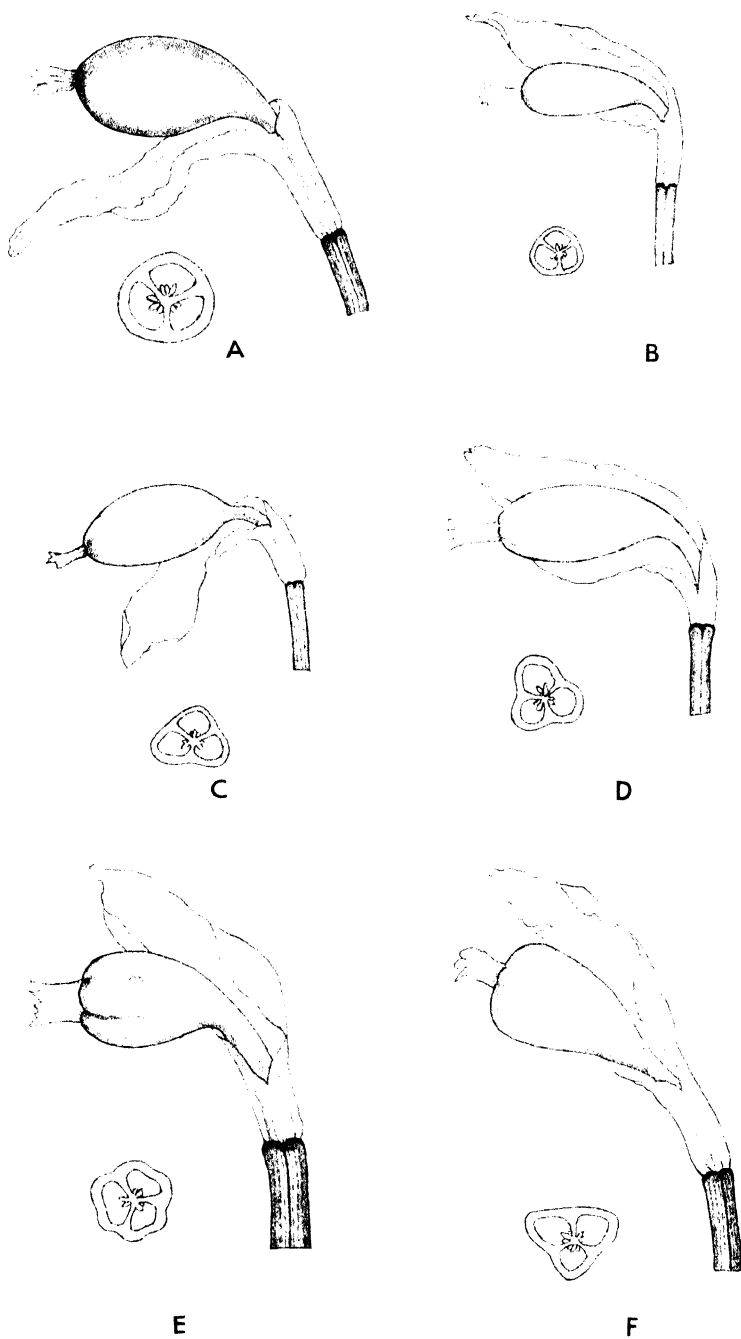


FIG. 5. —FRUITS OF NARCISSI WITH TRANSVERSE SECTIONS (nat. size).
 A, *N. nobilis*. B, *N. moschatus*. C, *N. alpestris*. D, *N. tortuosus*. E, *N. bicolor*.
 F, 'Empress.' F, *N. abscissus* var. *graciliflorus*.



FIG. 6.—*NARCISSUS CYCLAMINEUS* NATURALIZED IN THE WOOD AT WISLEY.

plants wherever possible. The forms that I have not seen or seen only in a dried state are distinguished respectively by n.v. (non vidi) or v.s. (vidi siccum). The Latin diagnoses of new groups are given as footnotes. The length of the corolla and other measurements appearing in the descriptions are those of dried specimens, and the term "bicoloured" is used only when a deep yellow corona forms a strong contrast to a white or very pale perianth. The pedicel is described as at the time of flowering; in fruit it sometimes lengthens.

It is desirable, in collecting these plants, to note the curvature or direction of the pedicel at the time of flowering, the colour of the flowers, the form and curvature of the perianth-segments and of the corona, and if possible the shape of the fruit, these features becoming readily obscured in drying.

I am indebted to Miss E. ARMITAGE, to Mr. J. E. ARNETT, and to Mr. P. R. BARR for supplying a number of useful living specimens; to Dr. E. J. COLLINS and Mr. J. PHILP, of the John Innes Horticultural Institute, Merton, for cytological information that has not yet been published; and to the authorities of the Linnean Society of London, the Royal Botanic Gardens, Kew, the Royal Horticultural Society, the Lindley Herbarium at Cambridge, and the Fielding Herbarium at Oxford, for facilities for preparing the accompanying plates.

NARCISSUS Linn. *Sp. Plant.* 289 (1753).

Subgenus AJAX Spach.

Narcissus subgenus *Ajax* Spach, *Hist. Nat. Vég. Phan.* xii, 432 (1846); Rouy, *Fl. France*, xiii, 28 (1912); *Ajax* Salisb. in *Trans. Hort. Soc.* i, 343 (1812); Haworth, *Narciss. Revis.* 111 (1819); *Mon. Narcissin.* 1 (1831); Herbert, *Amaryll.* 299 (1837); Jordan, *Icones Fl. Europ.* iii, 1 (1903); *Narcissus* Sect. *Ajax* Willkomm and Lange, *Fl. Hisp.* i, 151 (1861); *Narcissus* Sect. *Magnicoronati* Baker, *Amaryll.* 2 (1888), ex parte.

Leaves more or less flat, synanthous. Spathe 1-flowered. Perianth-tube turbinate or obconic, usually shorter than the large, campanulate or tubular corona; perianth-segments lanceolate to ovate, subequalling the corona in length. Stamens straight, equal, uniseriate, inserted near the base of the perianth-tube; anthers linear, sub-basifixed, surrounding the style. Style straight, longer than the stamens but shorter than the corona.

CONSPECTUS OF SPECIES.

SECTION I. CYCLAMINOPSIS.

Flowers yellow, concolorous; perianth-segments reflexed or rarely spreading.

1. *N. cyclamineus*.—Flowers small, deep yellow, with very short perianth-tube and rigidly reflexed segments. (p. 36)
2. *N. Johnstonii*.—Flowers of moderate size, pale lemon-yellow, with long perianth-tube and loosely reflexed (rarely spreading) segments. (p. 37)

SECTION II. PSEUDO-NARCISSUS.

Flowers yellow with corona of more or less deeper colour than perianth, bicoloured, or rarely white; perianth-segments not reflexed.

Series I. *Minores*.

Flowers small or very small, yellow or bicoloured, with flowering pedicel not deflexed or very short. Capsule more or less oblong, nearly terete or slightly trigonous.

*Corona inflated below and contracted about the middle. Filaments inserted close to base of perianth-tube (always?).

3. *N. asturiensis*.—Plant very dwarf. Flowers very small, yellow and nearly concolorous, with long perianth-tube. (p. 40)
4. *N. Lagoi*.—Plant tall. Flowers very small, yellow, with very long perianth-tube. (p. 42)

**Corona straight from the middle downwards. Filaments inserted 3–5 mm. above base of perianth-tube.

5. *N. minor*.—Plant dwarf, with narrow, erect-spreading foliage. Flowers small, yellow, with long perianth-tube and rather narrow segments; corona slightly spreading above. (p. 43)
6. *N. pumilus*.—Plant larger, with broader foliage. Flowers rather small, deep yellow, with long perianth-tube and narrow, distant segments; corona spreading above and distinctly lobed. (p. 45)
7. *N. nanus*.—Plant erect, with broad foliage. Flowers small, yellow, with rather long perianth-tube and ovate, imbricated segments; corona scarcely spreading above, obscurely lobed. (p. 48)
8. *N. parviflorus*.—Plant erect, with narrow foliage. Flowers small, bicoloured, with rather short perianth-tube and scarcely imbricated segments; corona not spreading above, very obscurely crenate-lobate. (p. 49)

Series II. *Lutei*.

Flowers small to large, deep yellow (paler in *N. pisanus*), with flowering pedicel not deflexed and rarely very short. Capsule more or less oblong-obovoid and trigonous.

*Plant tall. Pedicel suberect.

9. *N. hispanicus*.—Leaves usually twisted. Pedicel not very long. Flowers large, with twisted perianth-segments. (p. 50)
10. *N. longispathus*.—Leaves flat. Pedicel very long. Flowers rather small, with perianth-segments scarcely twisted. (p. 54)

**Plant less tall, with flat leaves. Pedicel shorter. Flowers usually of moderate size.

11. *N. obvallaris*.—Plant robust. Flowers (rarely large) with broad and generally short perianth-tube and broad, imbricated segments; corona broad, spreading above, variously lobed. (p. 55)
12. *N. pisanus*.—Plant rather slender. Flowers with medium perianth-tube and slightly imbricated segments; corona rather broad, spreading above, regularly lobed. (p. 59)
13. *N. confusus*.—Plant taller and robust. Flowers with rather broad perianth-tube and more or less twisted segments; corona rather broad, obscurely spreading and lobed. (p. 59)

***Plant slender or dwarf. Flowers with long perianth-tube and subtruncate corona.

14. *N. portensis*.—Plant slender, with short leaves. Pedicel rather short. Flowers of moderate size, with short, narrow perianth-segments. (p. 61)
15. *N. nevadensis*.—Plant dwarf. Pedicel very long. Flowers small, with relatively larger perianth-segments. (p. 62)

Series III. *Vulgares*.

Flowers of moderate size, yellow, straw-coloured, or bi-coloured, with very short, deflexed flowering pedicel. Capsule broadly oval, subglobose or obovoid.

16. *N. Pseudo-Narcissus*.—Flowers yellow or more or less bicoloured, with long perianth-tube and corona rarely much expanded or distinctly lobed. Capsule more or less roundly trigonous and often rugose. (p. 63)
17. *N. pallidiflorus*.—Flowers straw-coloured, with long perianth-tube and corona generally expanded and distinctly lobed. Capsule subterete, not rugose. (p. 69)
18. *N. macrolobus*.—Flowers bicoloured or straw-coloured, with shorter perianth-tube and more or less broad, expanded and distinctly lobed corona. Capsule scarcely trigonous, not rugose. (p. 71)

Series IV. *Nobiles*.

Flowers large, yellow or bicoloured, with flowering pedicel neither deflexed nor very short. Capsule more or less ellipsoid.

19. *N. Gayi*.—Flowers large, yellow, with short perianth-tube, narrow segments and long corona. Capsule trigonous. (p. 72)
20. *N. nobilis*.—Flowers more or less large, yellow, with rather long perianth-tube, often broader segments and expanded corona. Capsule nearly terete. (p. 74)
21. *N. leonensis*.—Flowers very large, bicoloured, with rather short perianth-tube, long segments and expanded corona. Capsule apparently nearly terete. (p. 75)

Series V. *Albiflori*.

Flowers rather small to rather large, pale sulphur or white, with rather short perianth-tube and more or less arcuate-recurved flowering pedicel. Capsule more or less ellipsoid.

22. *N. moschatus*.—Flowers of moderate size, drooping, sulphur-white, with slightly dilated and lobed corona. Capsule narrow, nearly terete. (p. 76)
23. *N. alpestris*.—Flowers rather small, drooping, white, with straight, subtruncate corona. Capsule less narrow, distinctly trigonous. (p. 79)
24. *N. tortuosus*.—Flowers rather large, less drooping, sulphur-white, with corona somewhat expanded into shallow lobes. Capsule oblong, bluntly trigonous. (p. 81)

25. *N. albescens*.—Flowers rather large, horizontal, pale sulphur (fading to nearly white), with corona expanded and lobed. Capsule subterete. (p. 82)

Series VI. *Bicolores*.

Flowers of moderate size or rather large, bicoloured or yellow, with short perianth-tube and nearly erect flowering pedicel. Capsule obovoid, trigonous or not. Chalazal end of seed not appendiculate.

26. *N. bicolor*.—Flowers rather large, usually bicoloured, with broad perianth-segments and somewhat expanded and obscurely lobed corona. Filaments inserted close to base of perianth-tube. Capsule nearly terete, furrowed. (p. 84)
27. *N. abscissus*.—Flowers more or less large, yellow, with moderate perianth-segments and cylindrical, obscurely lobed corona. Filaments inserted 2–4 mm. above base of perianth-tube. Capsule trigonous. (p. 88)

SECTION I. CYCLAMINOPSIS.*

Flowers yellow, concolorous; perianth-segments reflexed or rarely spreading.

I. NARCISSUS CYCLAMINEUS DC. (figs. 3A, 6, 7).

Narcissus cyclamineus DC. in Redouté, Liliac. viii, No. 486 (1816); Baker in Bot. Mag. No. 6950 (1887); Willk. & Lge. Fl. Hisp. Suppl. 38 (1893); Merino, Fl. Galicia, iii, 116 (1909); Coutinho, Fl. Portugal, 141 (1913); *Ajax cyclamineus* Haw. Mon. 2 (1831); *N. Pseudo-Narcissus* subsp. *N. cyclamineus* Baker, Amaryll. 4 (1888).

N. hispanicus minor luteus amplo calice foliis reflexis Vallet, Jardin du Roi Henri IV, pl. 20 (1608); Theatrum Florae, pl. 20 (1633).

Icones. Vallet *l.c.*; Theatrum Fl. *l.c.*; Bot. Mag. t. 6950; Gard. Chron. Ser. III, i, f. 46, and Ser. III, xxxix, f. 119; Garden, lix, p. 352.

Exsicc. Burbidge, Bot. Gard. Dublin, 1887, in Hb. Kew.; Fl. Lusit. Exsicc. No. 237, Schmitz, Valango, 1885; A. W. Tait, Oporto, 1886, in Hb. Kew.

Bulb small, ovoid, about 16 mm. long and 12 mm. broad, with whitish scales. Leaves ascending, 15–25 cm. long, *bright green, thick, channelled above* and broadly keeled below, 4–5 mm. broad, obtuse. Scape 15–20 (rarely –30) cm. long, erect, nearly terete, obscurely 2-edged, finely striate. Pedicel rather slender, not compressed, nearly straight below and strongly recurved above, as long or longer than the capsule (15–25 mm.). Flower *small, almost inverted, 40–45 mm. long* from margin of corona to apex of reflexed perianth-segments, *uniform deep yellow*, not scented; *perianth-tube remarkably short* and broad, only 2–3 mm. long; *perianth-segments* linear-oblong, subacute, about 20 mm. long, *rigidly reflexed upwards over the capsule*; *corona* oblong, *long and narrow*, equalling the perianth-segments, very slightly dilated at the margin, which is usually irregularly serrate-crenate, but occasionally only obscurely crenate or sub-entire. Filaments inserted close to base of perianth-tube. Style slightly exceeding stamens, with rather large stigma. Capsule 12–18 mm. long, narrowly obovoid, obscurely trigonous, not furrowed. Chromosome number 14 (Collins).

N. cyclamineus is perhaps the most distinct plant of the *Ajax* group. Its narrow, thick, bright green leaves are unlike those of any other species, and its flower is notable for its extremely short perianth-tube and rigidly reflexed segments. It is one of the earliest flowering species.

* Flores lutei, concolores. Perianthii segmenta reflexa vel raro patentia.

This local plant, which is only known to occur near Oporto in Portugal, and in Galicia (Coruña and Pontevedra), is remarkable for its rediscovery, in 1885, by Messrs. TAIT and SCHMITZ after being lost to cultivation for about 250 years. It is so well figured by VALLET and in the *Theatrum Florae* that its identity cannot be questioned.

The *N. totus luteus oblongo calice et reflexis foliis* of BESLER's *Hortus Eystettensis*, Ord. 3, f. 13 (1613), which is taken up by C. BAUHIN in the *Pinax*, p. 53 (1623), appears from the figure to be a different plant, in which the perianth-segments are not really reflexed but ascending. The plate recalls *N. abscissus*. This plant, represented by a similar figure, is also shown in RUDBECK's *Campi Elysii*, p. 72, f. 10 (1701). Another old figure that strongly resembles *N. cyclamineus* appears on Plate 65 (fig. 5) of SWEERT's *Florilegium* as *Pseudo-Narcissus flor. alb. tuba oblonga fimbrys luteis*.

The species is cited as of DE CANDOLLE, as his account (*l.c.*) is based on the plant of the *Theatrum Florae*, of whose identity there can be no doubt.

2. NARCISSUS JOHNSTONII sp. nov. (fig. 3B).

N. Pseudo-Narcissus var. *Johnstoni* Baker in *Gard. Chron.* N.S. xxv, 590 (1886); Henriques in *Bot. Soc. Brot.* v, 170 (1887); Baker in *Bot. Mag.* No. 7012 (1888); *Amaryll.* 3 (1888); N. 'Queen of Spain' hort. recent.

N. falsus tubo sexangulari flavus non descriptus Sweert, *Floril.* i, Pl. 21, 4 (1612)?

N. subflavus tubo sexangulo C. Bauhin, *Pinax*, 52 (1623)?; Rudbeck, *Camp. Elys.* 68, f. 3 (1701)?

Icones. *Bot. Mag.* t. 7012; *Garden*, xxxiv, p. 55; *Gard. Chron.* Ser. III, i, f. 60. *Exsicc.* Burbidge, cult. Dublin, 1888, in *Hb. Kew.*; Gadeceau, cult., 1893 and 1907, in *Hb. Mus. Brit.*; Barr, Galicia, in *Hb. Kew.*; Pugsley, Nos. 466 and 466A.

Bulb rather small, subglobose, 25–30 mm. long, with pale brown scales. Leaves erect, 20–30 cm. long, slightly glaucous, somewhat channelled and obscurely keeled, 7–12 mm. broad, obtuse and attenuate above. Scape erect, scarcely equalling leaves in length, slender, slightly compressed, bluntly 2-edged, very faintly striate. Spathe very rarely 2-flowered. Pedicel slender, sub-erect but curved at the apex, 15–25 mm. long. Flower of moderate size, horizontal or drooping, 40–45 mm. long (excluding ovary), of a uniform pale lemon yellow,



FIG. 7.—NARCISSUS CYCLAMINEUS.

From P. Vallet's *Jardin du Roi*
Henri IV (1608).

scentless; *perianth-tube* 16–20 mm. long, more narrowly funnel-shaped than in the other species of *Ajax*; *perianth-segments* narrowly oblong or lanceolate, scarcely imbricated, acute or mucronulate, *spreading-reflexed*, irregularly undulate, subequalling or exceeding the corona; *corona straight*, gradually a little dilated from the base upwards, 15–20 mm. in diameter at its apex, generally with an erect, nearly entire or very obscurely crenate-lobate and slightly plicate margin (more rarely the corona is relatively shorter and broader, with a slightly spreading and more distinctly crenate margin). Filaments inserted alternately about 4 mm. and 6 mm. above base of perianth-tube. Anthers without dark apical spot. Style exceeding stamens by about 10 mm., but shorter than the corona. Capsule about 22 mm. long, narrowly oblong-ellipsoid or fusiform, obtusely trigonous with three shallow furrows. Chromosome number 21 (Philp).

β. mirabilis var. nov.* (fig. 8).

Exsicc. Pugsley No. 485.

Plant (in specimens seen) dwarfer than type, 10–20 cm. high. Leaves 8 mm. broad. Scape smooth, not striate. Flowers 40 mm. long to margin of corona, 45 mm. to tip of perianth. Perianth-tube 20 mm. long; *perianth-segments* 25 mm. long, narrowly lanceolate, acute, waved and twisted, *spreading but not reflexed*, much exceeding the corona. Corona of the type, but slightly broader, not exceeding 20 mm. in length. Anthers with dark apical spot. Otherwise like the type.

N. Johnstonii is readily distinguished by its clear yellow, concolorous flowers, with long, narrow perianth-tube, more or less reflexed segments, and a subtruncate corona.

The history of this beautiful Daffodil curiously resembles that of *N. cyclamineus*. It was probably known to the horticulturists of the seventeenth century, although it cannot be certainly identified with any of the descriptions or figures in pre-Linnean works. It is evident that more than one yellow "clipt-trunk" Daffodil was in cultivation during this period, and of those figured by SWEERT (*l.c.*), *N. falsus tubo sexangulari*, which, judging from C. BAUHIN's definition, bore a light yellow flower, appears most nearly to represent *N. Johnstonii*. HAWORTH, in his Monograph (p. 4), created a genus *Oileus* to receive these Daffodils with truncate coronas and described five species, based on the figures of SWEERT and RUDBECK. As he observes, however, that he had seen none of these plants and inserted them with a view to excite enquiry, his brief accounts are of little value.

In 1885 *N. Johnstonii* was discovered near Oporto by E. JOHNSTON and A. W. TAIT, and soon afterwards it was collected by BARR. HENRIQUES appears to have suggested that it was a hybrid, *N. Pseudo-Narcissus* × *calathinus*, and BARR and other cultivators have treated it as *N. Pseudo-Narcissus* ('Santa Maria'?) × *triandrus*. BAKER, on the other hand, noting the uniformity of the specimens which he examined, preferred to describe it as a variety of *N. Pseudo-Narcissus*. In COUTINHO's Flora de Portugal, p. 141, what appears to be the same plant is shown as *N. Bulbocodium* × *Pseudo-Narcissus* Baker. If *N. Johnstonii* is a *triandrus* hybrid, it is remarkable that it uniformly possesses the equal stamens with linear, sub-basifixed anthers of an

* Planta quam typus humilior. Folia 8 mm. lata. Scapus lævis, haud striatus. Flos ad coronae marginem 40 mm. ad perianthii apicem 45 mm. longus. Perianthii tubus 20 mm. longus; segmenta 25 mm. longa, anguste lanceolata, acuta, undulata, torta, patentia sed non reflexa, coronam multo superantia. Corona typi sed paululum latior, haud plus 20 mm. longa. Antherae apice nigro-maculatae.

Ajax ; and if a *Bulbocodium* cross, some curvature of the stamens and style would be expected. The lack of these peculiarities tends to show that no *triandrus* or *Bulbocodium* element is present, as does also the relatively broad and flat foliage ; and these features seem to outweigh the somewhat *triandrus*-like corona, and the narrow perianth-tube and segments recalling a *Bulbocodium*. Moreover, at least in French gardens, the plant produces fully developed capsules and might perfect seeds under favourable conditions. Another fact that tells against hybridity is the plant's abundance. For nearly forty years it must have been collected annually for export in considerable quantity, for wild bulbs have been almost continuously on sale since the early nineties, in some years being offered by the thousand. It is difficult to believe that a *Narcissus* of hybrid origin could have multiplied to such an extent and remained so uniform. The 'Queen of Spain' is therefore treated as an Ajax, and, in view of its very distinct features, has been raised to specific rank. A varying form with a broader and less truncate corona, sometimes found with the typical plant, was formerly distinguished by BARR as 'King of Spain,' but I learn from his son that bulbs showing this peculiarity tend to revert to the ordinary form with narrower and straighter corona.

Of the variety *mirabilis* a few plants only were observed at a show of the Royal Horticultural Society in April 1931. It has been ascertained that these were collected in Northern Portugal for Messrs. VAN TUBERGEN, of Haarlem, by whom they were regarded as variants of a wild hybrid plant. But I can see nothing in them to indicate hybridity. There is a somewhat similar flower in Herb. Kew., labelled "*N. Johnstoni* v. Jose Marie, Hort. Barr, 1889."

In the Bol. Soc. Brot. V, p. 174, and t. B (1887), HENRIQUES has described a hybrid of *N. Pseudo-Narcissus* and *N. calathinus* occurring near Coruña, and proposed for it the name of *N. Taiti*. This plant is said to present two forms, of which one has a solitary flower and, as figured, in some degree resembles *N. Johnstonii*. But its perianth-segments are not reflexed and its stamens are stated to be unequal. At Kew there are two cultivated specimens (Hort. WOLLEY-DOD, 1889) said to represent two forms of *N. Pseudo-Narcissus* \times *triandrus*. Of these, one has a solitary flower, resembling var. *mirabilis*, but the arrangement of its stamens cannot be seen.

N. Johnstonii grows in Galicia as well as in Northern Portugal, but it is a local species that is probably threatened with extirpation, for in Britain it seems rarely to thrive and maintain itself in cultivation, and hence is unceasingly collected.

SECTION II. PSEUDO-NARCISSUS.*

Flowers yellow with the corona more deeply coloured than the perianth, bicoloured, or rarely white. Perianth-segments never reflexed.

* Flores lutei coronâ quam perianthio plus minusve saturiore, bicolores vel raro albi. Perianthii segmenta nunquam reflexa.

Series I. *Minores*.*

Flowers small or very small, yellow or bicoloured, with flowering pedicel not deflexed or very short. Capsule more or less oblong, nearly terete or slightly trigonous.

3. NARCISSUS ASTURIENSIS (Jord.) comb. nov. (figs. 3C, 9).

N. minor Brotero, Fl. Lusit. i, 549 (1804), ex parte ?; Willk. & Lge. Fl. Hisp. i, 151 (excl. syn. partim) (1861) ?; Coutinho, Fl. Portugal, 141 (1913), ex parte ?; *Ajax asturiensis* Jordan, Icon. Fl. Europ. iii, 4 (1903) ?; *N. minimus* hort. recent., non *A. minimus* Haw.

Pseudo-Narcissus minor luteus repens Hort. Eystt. 3rd Ord. f. 5 (1613) ?; *N. luteus repens* Bauh. Pin. 53 (1623) ?; Rudbeck, Camp. Elys. 73, f. 14 (1701) ?; *P. hisp. luteus minimus* Park. Par. 105 (1629) ?; *N. hisp. pumilus flore luteo amplo calice* Theatr. Fl. pl. 20 (1633) ?; *N. sylv. pallid. tuba aurea minimus* Barrel. Pl. Obs. t. 976 (1714) ?

Icones. Jordan, l.c. t. 367, as *A. asturiensis*; Garden, xxiii, 287, as *N. minimus*; Journ. Hort. Ser. III, xiv, f. 35, as *N. Pseudo-Narcissus minimus*.

Exsicc. Harper-Crewe, Pancorbo, 1881, in Hb. Kew., as *N. minimus*; Barr, Busdongo, 1888, in Hb. Kew., as *N. minimus*; Sennen, No. 5226, as *N. minor*; Fl. Lusit. Exsicc., Carisso and Mendonga, Serra da Estrela (1600 m.), 1925, in Hb. Zurich, as *N. minor*.

Bulb very small, ovoid, about 15 mm. long and 10 mm. broad, with very thin, whitish scales. Leaves usually 2-3, erect-spreading, 5-10 (rarely -15) cm. long, glaucous, channelled throughout, 2-6 mm. broad and somewhat dilated above, ribbed underneath, apex rounded-obtuse or sub-hooded. Scape 7-12 (rarely -15) cm. long, inclined, very slender, nearly terete (faintly 2-edged), strongly striate, solid. Spathe greenish, sub-herbaceous. Pedicel slightly curved, rather slender, shorter than or as long as the capsule (5-10 mm.). Flower very small, inclined or drooping, 20-25 mm. long (excluding ovary), soft yellow and almost concolorous, very slightly scented; perianth-tube shaded with green, 7-9 mm. long (shorter than the corona), slightly inflated above, narrower at its base than the top of the ovary; perianth-segments oblong-lanceolate, obtuse-mucronate, rather shorter than the corona, erect-spreading, slightly imbricated (more rarely narrower and not imbricated); corona inflated below, contracted about the middle, then rather abruptly dilated and spreading at the margin, which is sometimes divided into six rather obscure plicate-crenate lobes, sometimes scarcely lobed and rather deeply plicate-dentate or laciniate. Filaments inserted close to base of perianth-tube. Stigma relatively large. Capsule very small, about 10-14 mm. long, oval or pyriform, not trigonous or furrowed. Chalazal end of seed appendiculate. Chromosome number 14 (Collins).

β. brevicoronatus var. nov.†

Exsicc. Sennen, No. 138, as *N. minor*.

Leaves (usually 2) and scape slenderer than in the type. Spathe whitish, very thinly membranous. Pedicel very slender, 3-4 mm. long. Flower 15-20 mm. long, pale yellow; perianth-tube relatively longer, subequalling the segments and corona, which are almost of equal length; margin of corona less lobed and more serrate. [v.s.]

This, the smallest of the group, has been generally confused with *N. minor* in recent botanical works. From its characteristic habit and its peculiarly formed flowers it has the aspect of a distinct species, and it differs clearly from *N. minor* by its constricted corona and the

* Flores parvi vel minimi, lutei vel bicolores, pedicello florifero nec deflexo nec brevissimo. Capsula plus minusve oblonga, fere teres.

† Folia (saepissime 2) scapusque quam in typo graciliores. Spatha albida tenuissime membranacea. Pedicellus gracillimus, 3-4 mm. longus. Flos 15-20 mm. longus, pallide luteus; perianthii tubus relative longior, segmenta coronamque, quae fere aequilonga sunt, aequans; coronae margo minus lobatus magis serratus.

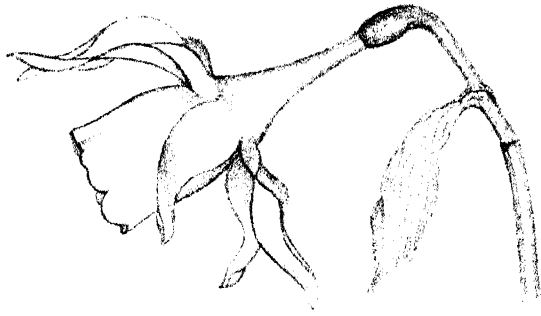


FIG. 8.—NARCISSUS JOHNSTONII var. MIRABILIS (nat. size) (above),
N. NANUS (below).

Upper figure from plant exhibited at Vincent Square 1931; lower from
Dean Herbert's drawing in the Lindley Library.

[To face p. 40.

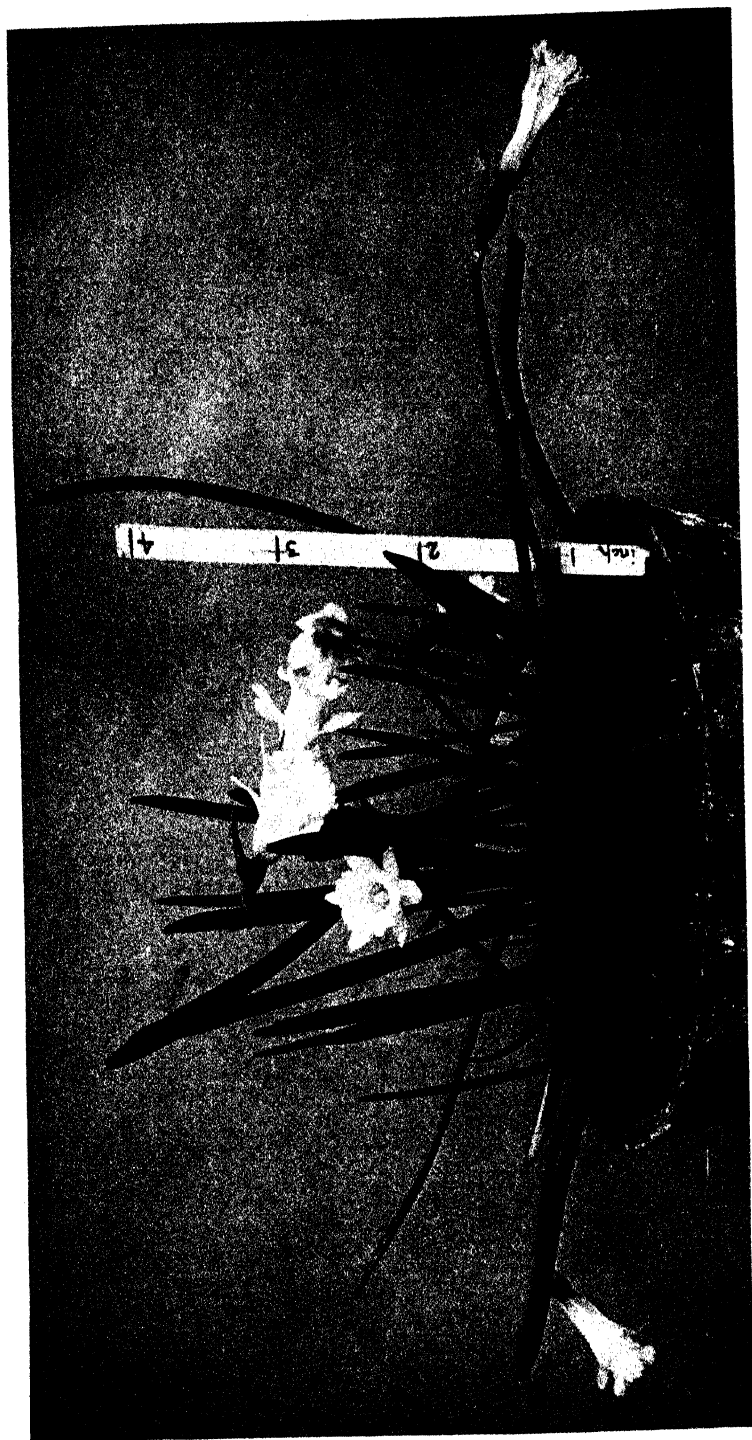


FIG. 9.—*NARCISSUS ASTURIENSIS*
From plants collected in the Asturias Mountains by Miss HILDA SCHAFER (1931).

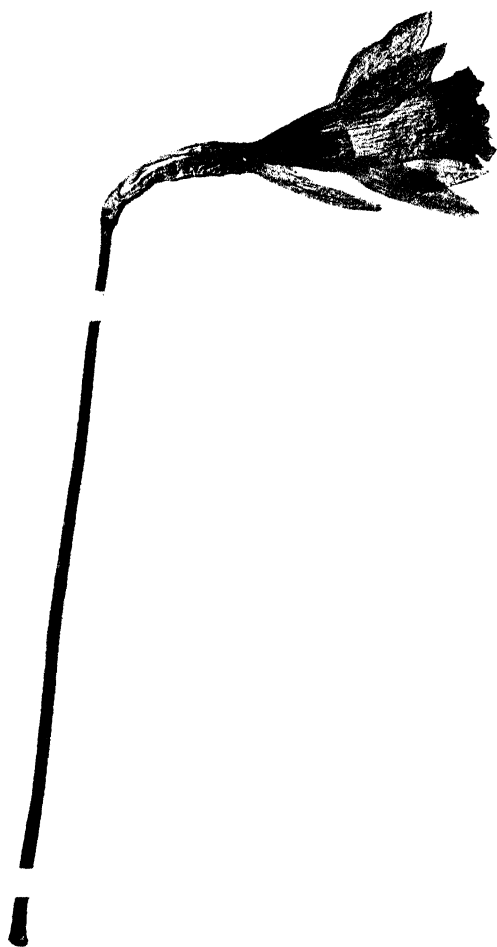


FIG. 10.—NARCISSUS MINOR (nat. size).
From the specimen in the Linnean Herbarium.



Fringed Narcissus
FIG. 11. --NARCISSUS PUMILUS VAR. FIMBRIATUS.
From J. Hill's *Eden, or a Compleat Body of Gardening* (1757).

basal insertion of its stamens. Its cytology also indicates its distinctness, its chromosome number being fourteen as compared with fifteen for *N. minor* and *N. pumilus*. It is apparently a widely spread species of the mountains of Spain from Asturias to Castile, extending into Central Portugal and possibly Galicia. Material from the different stations that has been examined varies appreciably. The diminutive variety *brevicoronatus* was collected in Castile. The species is one of the first to flower.

N. asturiensis was not distinguished by CLUSIUS, but it is presumably the above-cited plant of BESLER's Hortus Eystettensis, which is clearly separated from *N. minor*. This plant, sometimes fairly and sometimes badly figured, appears in the works of several succeeding authors up to the time of BARRELIER and was evidently the smallest known Narcissus of the Ajax group. There is a specimen (a flower only, 18 mm. long) without leaves in the Sloane Herbarium (H.S. 319, f. 71) under the name of *N. juncifolius omnium minimus fl. aureo*, which may be confidently referred to *N. asturiensis*, although this cannot be confirmed by examining the insertion of the stamens. The specimen was received from BOERHAVE.

It is also uncertain whether the present species was known to LINNAEUS. It may have been regarded by him as belonging to *N. minor*, for while (in describing this species) in the case of C. BAUHIN and RUDBECK he cites *N. parvus totus luteus*, which is *N. minor*, and rejects *N. luteus repens*, which is probably *N. asturiensis*, in the case of BARRELIER he reverses his selection and cites No. 976, *N. pallidus minimus* (perhaps *N. asturiensis*), in preference to No. 975, *N. totus luteus minor* (*N. minor*). This may have been intentional, with the view of including both plants as falling under his *N. minor*. The insertion of "*spatha virens*"—a character of typical *N. asturiensis*—in his description of *N. minor* may possibly admit of the same explanation.

N. asturiensis seems to have been unknown to CURTIS, SALISBURY, HAWORTH and HERBERT. In his Revisio HAWORTH created a variety *minimus* of *A. minor*, distinguished as "*foliis humum versus patulo-effusis coerulescenti-glaucis, flore ante anthesin ipsam humum nutantim tangente*." This was raised to a species, *A. minimus*, in the Monograph and identified with *N. minor* Curtis, Bot. Mag. No. 6, but HERBERT (Amaryll. p. 415), who reduced the plant to a variety *humilior* of *N. minor*, stated that "the difference was scarce worth remarking." Of this plant there is good material at Kew, received from J. GAY, and it is clearly a small form of *N. minor* and not the present species. In HERBERT's Amaryllidaceae (pp. 299, 300) two varieties, *cuneiflorus* Salisb. and *pumilus* Salisb., are inserted under *N. minor*, both barely described but depicted in figures on Plates 39 and 43, which recall *N. asturiensis*. HERBERT states that there are specimens of these varieties in Banks' Herbarium, but they cannot now be traced; and as he remarks (*l.c.*, p. 415), "I have never had *pumilus* and *cuneiflorus*," it is clear that he knew little

about them. SALISBURY'S names *pumilus* and *cuneiflorus* originally referred to one plant only, which is a widely different form.

When *N. asturiensis* was collected in Spain by BARR and others in the eighties, specimens were sent to Kew, and they were identified with the smallest form then known there, *A. minimus* Haw., and the figure of Bot. Mag. No. 6. It was probably impossible at that time to compare living examples, for HAWORTH'S plant seems to have been no longer in cultivation, and no accurate examination was apparently made, for the essential differences of the corona and stamens were not detected. The excellent description by JORDAN, with plate and dissection, was founded on material collected in the Asturias by REVERCHON in 1864.

BROTERO, in Fl. Lusitânica, I, p. 549, has described what may include the present species under the name of *N. minor* L., and has been followed by his successor COUTINHO. This is admissible in an aggregate sense in view of LINNAEUS' citation of BARRELIER No. 976 among his synonyms. A similar treatment has been adopted in the Flora Hispanica by WILLKOMM and LANGE, who, however, cite among their synonyms the *Pseudo-Narcissus minor hispanicus latifolius* of CLUSIUS, which is not *N. asturiensis*. It is probable that these authors were acquainted with one plant only of this group, as a native of Portugal or Spain, and that, as neither of them had presumably seen the Linnean specimen, which is the type of *N. minor*, they regarded the native plant which they knew as the normal Linnean species and described it under the name of *N. minor* accordingly. All the wild plants collected in Spain by SENNEN and others as *N. minor* that have been examined belong to *N. asturiensis*.

4. NARCISSUS LAGOI Merino, Fl. Galicia, iii. 615 (1909).

Bulb of moderate size, ovoid-globose, 20-40 mm. long and broad, with brownish scales. Leaves 2, spreading, shorter than the scape, glaucescent, channelled, 8-10 mm. broad, ribbed underneath, more or less twisted, obtuse and apically sub-hooded. Scape elongate, 40-50 cm. long, cylindrical, striate, with long sheaths below. Pedicel 10-15 mm. long. Flower very small, horizontal, 20-25 mm. long (including ovary), yellow with base of perianth-tube greenish; perianth-tube nearly as long as the corona, hexagonal; perianth-segments linear-oblong, erect-spreading, obtuse, mucronate, not twisted, subequalling the corona; corona ventricose at the base, strongly contracted about the middle, and dilated above, with margin plicate and cut into many erect, ovate or oblong, obtuse lobules, about a quarter as long as the corona itself. Stamens shorter than style. Stigma trilobed. Capsule very small, 5-7 mm. long and a little broader, obovoid-globose. [n.v.]

This remarkable plant was collected on the banks of the Minho near Lugo, in Galicia, and was at first referred to *N. minor* L. MERINO'S description, from which the above account has been taken, seems quite satisfactory, except that there is no allusion to the insertion of the filaments on the perianth-tube, which is an important feature in this series. The form of the flower plainly resembles that of *N. asturiensis* and not of *N. minor*, and the channelled foliage and cylindrical scape also recall the former species. It may be expected that the filaments will be found to be free to the base of the perianth-

tube, and if so, *N. Lagoi* is clearly an ally of *N. asturiensis*, which grows in the adjacent provinces. The occurrence of a tall Ajax species, with the tiny flowers of *N. asturiensis*, is somewhat analogous with the presence of the Greek *N. hellenicus* Pugs. among the Poet's Narcissi.

5. NARCISSUS MINOR Linn. (figs. 3D, 10).

Narcissus minor Linn. Sp. Pl. ed. 2, 415 (1762), et ejusdem herb.; Brotero, Fl. Lusit. i, 549 (1804), ex parte?; Mordant de Launay, Herb. Amat. iii, No. 165 (1819); Willk. & Lge. Fl. Hisp. i, 151 (1861)?; Coutinho, Fl. Portugal, 141 (1913), ex parte?; *N. exiguus* Salisb. Prodr. Stirp. 220 (1796); *Ajax pygmaeus* Salisb. in Trans. Hort. Soc. i, 343 (1812); *Ajax minor* Haw. Narciss. Revis. 111 (1819); Mon. i (1831); Herbert, Amaryll. 299 (1837); *N. Pseudo-Narcissus* subsp. *N. minor* Baker, Amaryll. 3 (1888); *N. nanus* and *N. minor*, ex parte, hort. recent.

Pseudo-Narcissus minor hispanicus latifolius Clusius, Hist. ii, 165 (1601)?; *P. minor hispanicus* De Bry, Floril. Nov. Pl. 15 (1612); *Narcissus totus luteus montanus minimus* Hort. Eystt. 3rd Ord. f. 1 (1613); *N. parvus totus luteus*, C. Bauh. Pin. 53 (1623); Rudbeck, Camp. Elys. 72, f. 11 (1701); *P. hispanicus minor luteus* Park. Par. 105 (1629); Merian, Floril. Ren. t. 15 (1641); *Bulbocodium minus* J. Bauh. Hist. ii, 593 (1651)?; Ray, Hist. 1131 (1688)?; *N. sylvestris totus luteus minor* Barrel. Pl. Obs. t. 975 (1714)?

Icones. Merian, l.c. t. 15; Rudbeck, l.c. f. 11; Herb. Amat. iii, f. 165; Herbert, l.c. pl. 38, f. 2.

Exsicc. J. Gay, Jardin des Plantes, Carrés Chaptal, 1818 and 1860, in Hb. Kew.; Collinson, Mill Hill, in Hb. Mus. Brit., as *N. exiguus*; Gadeceau, cult., in Hb. Mus. Brit. as *N. nanus*.

Bulb small, subrotund-ovoid, about 20 mm. long, with thin, whitish-brown scales. *Leaves erect-spreading, 8–12 cm. long, glaucous, slightly channelled, 4–6 (rarely –8) mm. broad, attenuate above and rounded-obtuse.* Scape 12–15 cm. long, nearly erect or inclined, slender, 2-edged but little compressed, strongly striate. Pedicel porrect and slightly curved, slender, usually nearly as long as the capsule (10–15 mm.). *Flower small, horizontal or nodding, 30–35 mm. long (excluding ovary), soft yellow with deep yellow corona and green-tinted perianth-tube, faintly scented; perianth-tube long (about 14 mm.), at its base subequalling the ovary; perianth-segments ovate-lanceolate (inner narrower), acute, slightly imbricated below, erect-spreading and somewhat waved, almost equalling the corona; corona without any contraction of the tube, gradually a little dilated towards its margin and contiguously 6-lobed, with lobes erect-spreading, irregularly incised-crenate, strongly plicate and transversely rugose, the plication and rugosity extending down the corona within.* Stamens and style relatively short; *filaments inserted about 4 mm. above base of perianth-tube*; stigma small, deeply 3-lobed. Capsule 15–25 mm. long, narrowly obovoid or oval-oblong, very bluntly trigonous and slightly furrowed. Chalazal end of seed strongly appendiculate. Chromosome number 15 (Collins).

β. minimus (Haw.) comb. nov.

N. minor Curtis, Bot. Mag. No. 6 (1787); *A. minor a minimus* Haw. Narciss. Revis. 112 (1819); *A. minimus* Haw. Mon. i (1831); *A. minor v. humilior* Herb. Amaryll. 299 (1837).

Icon. Bot. Mag. t. 6.

Exsicc. J. Gay, Carrés Chaptal, 1860 and 1863, in Hb. Kew., as *N. minimus* Haw.

Plant dwarfer than typical *N. minor*, with spreading leaves and slender, nodding scape. Flower very small, 20–30 mm. long. [v.s.]

The determination of *N. minor* is facilitated by its being a species of LINNAEUS, which is represented in his herbarium and is included in his enumeration of 1767, as shown in JACKSON'S Index. The Linnean specimen consists of a single flower still in good condition though faded, and the sheet is marked in LINNAEUS' handwriting "~~meschatus odoratus~~ minor." The flower evidently belongs to a form covered by the

author's account and the synonyms which he cites from CLUSIUS, C. and J. BAUHIN, RUDBECK and BARRELIER. It agrees with his diagnosis but not entirely with the description, of which one feature (*spatha virens*) is more nearly applicable to *N. asturiensis*. But it is doubtful whether this species was known to LINNAEUS, and evident that he did not accurately distinguish these dwarf Daffodils, and in a general way would have included them all under his *N. minor*. There is no indication that, when writing his account, he had any particular form in view, and this being so, there seems to be no option but to treat the Linnean specimen as the type of the species, and this view has been taken accordingly.

N. minor, as thus interpreted, was known as a cultivated plant as early as the beginning of the seventeenth century, and it had already been noticed by LOBEL [Stirp. Hist. p. 62 (1576)]. From PARKINSON we learn that it was grown in England shortly after this date, and a century later it was known to RUDBECK in Scandinavia. LINNAEUS gives its habitat as Spain, but whether this is simply taken from CLUSIUS or based on independent information is not certain. Among more recent authors SALISBURY [Trans. Hort. Soc. i. 343 (1812)] states that his *Ajax pygmaeus*, which is identical with *N. minor*, is wild in the mountains of Gerez, in Portugal, but this is repeated from BROTERO's Flora Lusitanica, i. p. 549, which SALISBURY cites under his *A. pygmaeus*. HAWORTH's only remark on the subject (Narciss. Revis. p. 112) gives the plant as coming chiefly from Spain, while HERBERT (Amaryll. p. 299) states that it is a native of the Pyrenees. MORDANT DE LAUNAY (*l.c.*) describes the species as a French garden plant, and furnishes an excellent figure with accurate dissections.

It is noteworthy that although a number of cultivated or naturalized examples of this plant exist in the Herbaria at Kew and the British Museum, no wild specimens can be traced. The *N. minor* of BROTERO (*l.c.*) and of COUTINHO (Fl. Portugal, p. 141), to judge from the descriptions, might well be *N. asturiensis*, and with this the account of WILLKOMM and LANGE (Fl. Hispanica, i. p. 151), excluding synonymy in part, also agrees. And, as already noticed, the wild Spanish sets sent out as *N. minor* by SENNEN are actually *N. asturiensis*.

There is a specimen in Herb. Mus. Brit. from the French Pyrenees (Mail du Cric, Luchon), labelled *N. minor*, which at first sight might appear correctly named, but it shows the short, bent pedicel and the serrated corona of *N. Pseudo-Narcissus* and will be treated here as a dwarf variety of that species. There are also wild examples at Kew which were sent to GAY in 1820 and 1862 from near Grasse, in Provence, as *N. minor*. The later of these specimens GAY was unable to separate from *N. Pseudo-Narcissus*, and they both appear to be a small form of this, somewhat similar to that growing at Mail du Cric. In the Manchester Herbarium there is another similar example from Grasse, collected by Miss TOWNSEND and labelled *N. minor*. Kew also possesses two gatherings named *N. minor*, which were collected by

MOGGRIDGE near Mentone. Some doubt attaches to these specimens, which are possibly referable to *N. pumilus* Salisb.

It would appear, therefore, that *N. minor* has not been collected as a wild plant for a very long period, and that nothing is actually known of its native habitat beyond the statements of CLUSIUS and BROTERO. But as *N. pumilus* has recently been re-found in the Gerez Mts. of Portugal, it is not unlikely that *N. minor* also may occur in that region or in the Serra da Estrella, and will be once more collected.

Although this plant has been lost as a botanical species, it has been continuously grown by horticulturists from the time of PARKINSON, or even earlier, right up to the present day. SALISBURY [Trans. Hort. Soc. i. 343 (1812)] stated that it was easy to cultivate and had been grown in England since the time of PARKINSON. In the Gardeners' Chronicle, xix. 348 (1883), WOLLEY-DOD remarks: "Fifty years ago only one sort (*N. minor*) was common in our gardens. . . . In the border it increases fast." The form of modern gardens that matches the Linnean specimen and is therefore typical *N. minor* L. is still sold by Messrs. BARR and others under the name of *N. nanus*, but some Dutch growers, I believe, list it as *N. minor*. The confusion with *N. nanus* will be discussed under that species. Messrs. BARR also cultivate as *N. minor* some allied forms of stronger growth and finer flowers with more twisted perianth-segments and expanded corona. Two of these forms, which are similarly old garden plants, will be dealt with under *N. pumilus*.

As already shown, HAWORTH separated his *A. minimus* from *A. minor* (Monograph, p. 1) by its weak, spreading leaves and nodding scape, and cited CURTIS, Bot. Mag. No. 6, as a synonym. There are specimens at Kew named by GAY "*N. minimus* Haw." which are obviously not *N. asturiensis* but a weak form of *N. minor*. They agree with the descriptions of HAWORTH and HERBERT, and appear correctly named. CURTIS' plate does not clearly show the form of the corona and perianth-tube, and has no dissections, so that it might almost equally well represent a small form of *N. minor* or *N. asturiensis*, but it is clear from the cultural remarks that the former of these is intended. The variety *minimus* seems to have been lost to cultivation since the time of HERBERT and before *N. asturiensis* was re-introduced into Britain.

6. NARCISSUS PUMILUS Salisb. (fig. 3E).

- Narcissus pumilus* Salisb. Prod. Stirp. 220 (1796); *N. minor* Brotero, Fl. Lusit. i, 549 (1804), ex parte?; Coutinho, Fl. Portugal, 141 (1913), ex parte?; *Ajax cuneiflorus* Salisb. in Trans. Hort. Soc. i, 343, excl. syn. pro maj. parte (1812); Haw. Narciss. Revis. 113 (1819); *A. pumilus* Haw. Mon. 1 (1831); Sweet, Brit. Fl. Garden, 2nd ser. ii, No. 143 (1833); *N. minor* var. *cuneiflorus* Willk. and Lge. Fl. Hisp. i, 151 (1861)?; *N. minor* (ex parte) hort. recent.
- Narcissus totus luteus medius* De Bry, Floril. Nov. Pl. 15 (1612); Merian, Floril. Ren. t. 15 (1641); *N. pumilus* Passeus, Hort. Florid. iv, 8 (1614)?; *Pseudo-Narcissus hisp. medius luteus* Park. Par. 104 (1629)?; *N. hisp. medius luteus* Theatr. Fl. pl. 20 (1633)?

Icones. De Bry, *l.c.* pl. 15; Merian, *l.c.* t. 15; Sweet, *l.c.* t. 143; Red. Lil. viii, 480, as *N. minor*; Burbidge, *Narciss.* Pl. 5A, as *N. Pseudo-Narcissus v. minor*?

Exsicc. Hort. Soc. Hort. Lond. 1834, in Hb. Kew. and Hb. Lindley, as *A. pumilus*; Pugsley, No. 475.

Bulb rather small, subrotund-ovoid, 25–30 mm. long, with pale brown scales. *Leaves erect-spreading*, undulate, 12–20 cm. long, glaucous, nearly flat and not twisted, 5–8 (rarely 10) mm. broad, attenuate above, obtuse. Scape 15–22 cm. long, suberect, moderately stout, little compressed, 2-edged, striate. Pedicel porrect and slightly curved, rather slender, 10–15 mm. long. *Flower rather small, horizontal*, 35–45 mm. long (excluding ovary), bright yellow, with golden-yellow corona and perianth-tube tinged with green at the base, faintly scented; *perianth-tube long* (16–18 mm.), narrowly obconic as in *N. minor*; *perianth-segments narrow*, oblong-lanceolate, subacute, mucronulate, not imbricated, erect-spreading and slightly twisted, equalling the corona; *corona straight below, dilated towards the margin* and cut into six distinct, spreading lobes, which are irregularly and sparingly crenate-dentate, more or less regularly plicate, and minutely transversely rugulose. Stamens and style relatively short; *filaments inserted 3–4 mm. above base of perianth-tube*; stigma small, deeply 3-lobed. Capsule about 20 mm. long, oblong or ellipsoid, bluntly trigonous, not furrowed. Chromosome number 15 (Collins).

β. fimbriatus var. nov.* (fig. II).

Narcissus totus luteus medius Hill, Eden, 184 (1757).

Icon. Hill, Eden, *l.c.*

Exsicc. Pugsley, No. 470 (type); Gadeceau, cult. 1901, in Hb. Mus. Brit., as *N. minor*.

Leaves suberect or reflexed above. Scape 15–25 cm. long, nearly erect. Perianth-segments rather narrower, spirally twisted; *margin of corona cut into six distinct, spreading lobes*, which are deeply incised-dentate or subfimbriate, with about 3 narrow segments to each lobe. Otherwise as in the type.

N. pumilus is a larger plant in all its parts than *N. minor*, with very narrow perianth-segments and an elaborately frilled corona that almost recalls *N. hispanicus*.

Like *N. minor* the present species is an old garden Daffodil, still in cultivation, whose origin until very lately was unknown. It has now been found in a dwarf form in the Serra de Gerez in Portugal, at an altitude of 6,000 feet, by Dr. P. L. GIUSEPPI, and it is said to grow also in the Serra da Estrella. Dr. DENNIKER, of Zurich, who collected *N. asturiensis* in the Serra da Estrella in 1921, reports that he also saw there another dwarf Daffodil with larger and more deeply coloured flowers. This was probably *N. pumilus* or *N. minor*. The two stations have been given in the Portuguese floras for *N. minor*, with which both *N. pumilus* and *N. asturiensis* have no doubt been confused.

It is not certain how far *N. pumilus* was known to the early writers, for some of the synonyms cited under *N. minor* may refer to or include it; but it appears to be the plant of DE BRY and MERIAN cited above, and that figured in the Hortus Floridus. The flower of DE BRY's and MERIAN's figures recalls the variety *fimbriatus* almost as much as the typical form. *N. pumilus* seems also to have been known to PARKINSON and to be figured in the contemporary Theatrum Florae. In HILL's Eden the variety is appropriately termed the "Fringed

* *Folia suberecta vel sursum reflexa. Scapus 15–25 cm. longus, fere erectus. Perianthii segmenta paulo angustiora, spiraliter torta; coronae margo in sex lobos distinctos patentes, alte inciso-dentatos vel subfimbriatos fissus.*

Narcissus," and is unmistakably figured and described. HILL states that it is a useful early-blooming Narcissus with flowers of a fine yellow.

There is no evidence that this plant was known to LINNAEUS, but it was redescribed by SALISBURY (*l.c.*) as *N. pumilus* in 1796, which name was subsequently changed by its author to *Ajax cuneiflorus*. SALISBURY distinguished two allied species, *N. exiguus* (*N. minor* L.) and *N. pumilus*, of the former of which there is material in the British Museum Herbarium received from COLLINSON and labelled in SALISBURY's hand "*exiguus* Salisb." This specimen is identical with LINNAEUS' type of *N. minor* and is cited under that species. There appear to have formerly been authentic specimens of the second plant in Herb. Mus. Brit. under the names of *pumilus* and *cuneiflorus*, but these cannot now be traced. And it happens unfortunately that none of these dwarf species is included in the collection of SALISBURY's drawings at South Kensington. There is, however, a specimen in Lindley's Herbarium, now at Cambridge, received from the London Horticultural Society in 1834, and named "*A. pumilus*" by SABINE and HAWORTH, which is evidently authentic. This shows a flower 43 mm. long, identical, so far as can be seen, with that of the plant now described. Another similar specimen, of the same date and from the same source, is at Kew. HAWORTH, in his *Revisio* (*l.c.*), furnishes a detailed description of *N. pumilus*, noting its broad leaves and spreading, lobed corona, and emphasizing its peculiarly narrow, non-imbricating perianth-segments. There is no discrepancy between his account and the original diagnosis of SALISBURY. SWEET (*l.c.*) also describes and figures *N. pumilus* with similar characters, and states that it was from HAWORTH that his plants were obtained.

On comparing the authentic specimens of *N. pumilus* and the figures of SWEET and HILL with the plants grown at the present day by Messrs. BARR as *N. minor* and "*N. minor* seedling," it is clear that they are all conspecific and that "*N. minor* seedling" most nearly agrees with the typical species. This form was stated in SALISBURY's original account (*Prodr. Stirp.* p. 220) to be difficult to cultivate and to be grown in Holland, and it is understood that "*N. minor* seedling" is still obtained from that country. HAWORTH thought that *N. pumilus* came from Spain, but this seems to have been merely conjecture.

The variety *fimbriatus* appears certainly to have been grown in Britain at least since the middle of the eighteenth century, but without ever becoming widely known. There is no definite information of the source whence it was originally obtained, but it was probably grown in Holland with the type at some former period.

Specimens collected by MOGGRIDGE at two spots on the French Riviera (perhaps wild stations) in 1869 and 1871, and referred to *N. minor*, are possibly forms of *N. pumilus*. And the *exsiccata* "Reverchon, Pl. de France, 1886, No. 134, Mont Aution, Alpes Maritimes," as *N. Pseudo-Narcissus*, seems to be the same plant. There is a further example in Herb. Lacaita (No. 4971) from La Granja,

in Old Castile, that likewise recalls this species, although its pedicel is rather short and the colour of the flowers now indeterminable.

7. NARCISSUS NANUS Spach (figs. 3F, 8, 12).

Narcissus nanus Spach, Hist. Nat. Vég. Phan. xii, 433 (1846); *Ajax minor* var. *conspicuus* Haw. Narciss. Revis. 112 (1819); *A. nanus* Haw. Mon. 2 (1831); *A. minor* var. *nanus* Herb. Amaryll. 300 and 415 (1837); *N. nanus* (ex parte) and *N. lobularis* hort. recent., non *A. lobularis* Haw.

Pseudo-Narcissus minor hispanicus latifolius Clusius, Hist. ii, 165 (1601)?

Icones. Barr, Narcissus, p. 35; Nicholson, Dict. Gard. ii, f. 647, as *N. Pseudo-Narcissus minor*.

Exsicc. Hb. Fielding, as *N. minor conspicuus* Sab.; J. B. Syme, cult., 1864, in Hb. Manchester; Hort. Soc. 1884, in Hb. Kew., as *N. minor major*; Gadeceau, cult. Vilmorin, in Hb. Mus. Brit., as *N. lobularis*; Pugsley, Nos. 464 and 464A.

Bulb small, subrotund, about 25 mm. long, with thin, pale brown scales. Leaves nearly erect, 12–18 cm. long, glaucous, flat, 8–14 mm. broad, with rounded-obtuse, scarcely attenuate apex. Scape 15–20 cm. long, erect, rather slender, much compressed, finely striate. Pedicel inclined and curved above, 7–10 mm. long. Flower small, horizontal or ascending, 30–35 mm. long (excluding ovary), sulphur-yellow, with tube slightly tinged with green and bright yellow corona, deepening towards the margin, faintly scented; perianth-tube 11–14 mm. long, more broadly obconical than in *N. minor* but with base narrower than ovary; perianth-segments ovate (inner narrower and ovate-oblong), obtuse-mucronate or shortly acute, imbricated, erect-spreading and nearly flat, a little shorter than the corona; corona broad, straight, scarcely dilated above, plicate-rugose and with suberect margin cut into contiguous, much plaited and slightly crenate lobes. Filaments inserted about 3 mm. above base of perianth-tube. Stigma not deeply lobed. Capsule 12–16 mm. long, oblong-obovoid, nearly terete, very obscurely trigonous and furrowed, slightly rugose. Chromosome number 14 (Philp).

N. nanus, which is an early bloomer, differs widely from *N. minor* and *N. pumilus* by its stiffer, more erect growth and broader, more obtuse foliage, as well as its rather paler flowers, with distinctly broader perianth-segments and corona, and its shorter, broader capsules. It is therefore treated as a separate species.

This species has not at any time been identified in the works of pre-Linnean authors, but judging from its broad foliage, it may possibly be the *Pseudo-Narcissus minor hispanicus latifolius* of CLUSIUS [Rar. Plant. Hist., ii. 165 (1601)]. It is first mentioned as a variety of *A. minor* in HAWORTH's Revisio (*l.c.*), where it is described as a taller plant with erect leaves, received under the name of *N. major* from Holland and growing in the garden of the London Horticultural Society. HAWORTH had not yet seen its flower. In the Monograph it is raised to specific rank as *A. nanus* (dwarf sulphur), with a diagnosis "Corollae laciniis subsemierectis ovatis sulphureis tubo sesquiongioribus, corona perlutea subrecta, ore lobatim crenata plicatula crispa . . . Folia glaucissima, semiunciam lata. Flos sesquiuncialis fere inodorus, aperiens f. Feb. seu i. Mart." Herbert reduces the plant to a variety *nanus* of *A. minor*, and in his "Postscript" (*l.c.* 415) states that it is more erect than the type, with a scape 8 inches high, and less tortuous leaves $\frac{3}{8}$ inch wide. It fortunately happens that among HERBERT's drawings preserved in the library of this Society is an excellent coloured figure labelled "*Ajax nanus*" in HERBERT's handwriting. The early specimen in Herb. Fielding cited above, and that at Manchester,

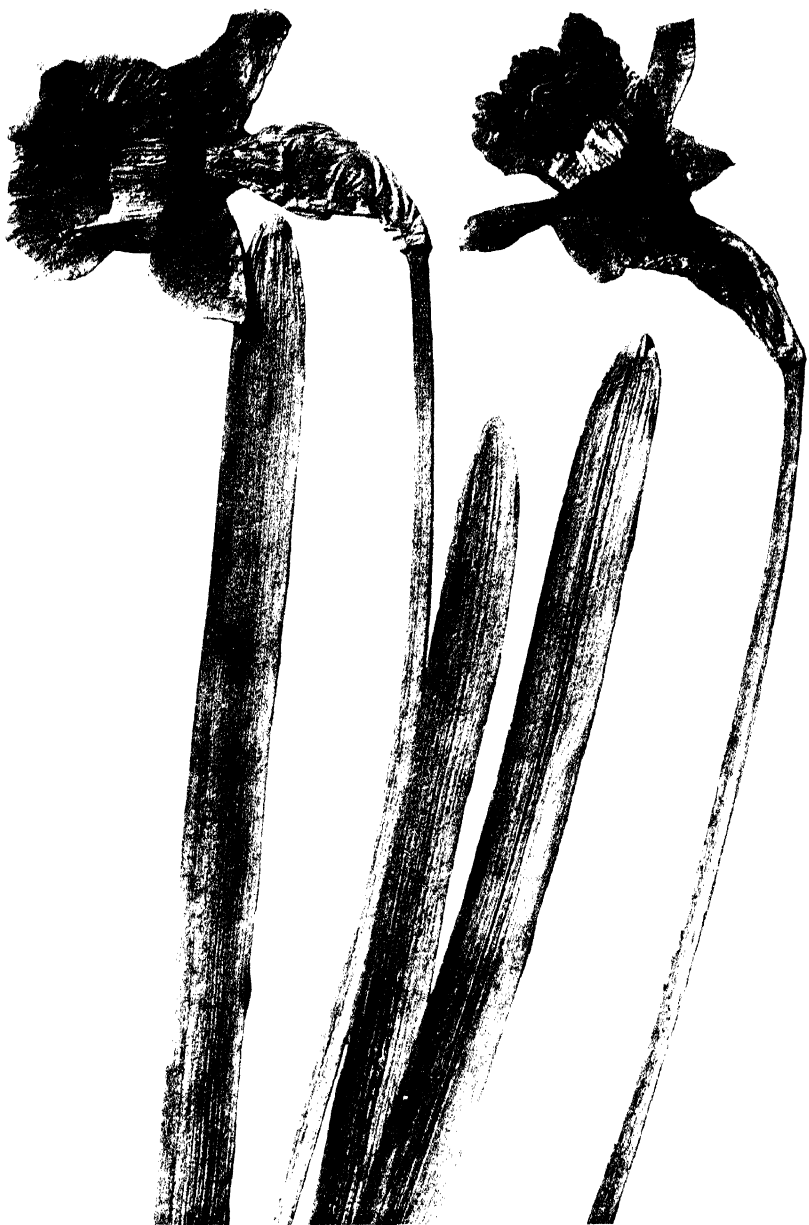


FIG. 12. NARCISSUS MINOR CONSPICUUS Sab. (nat. size) (= N. NANUS).
From the specimen in Herb. Fielding at Oxford.

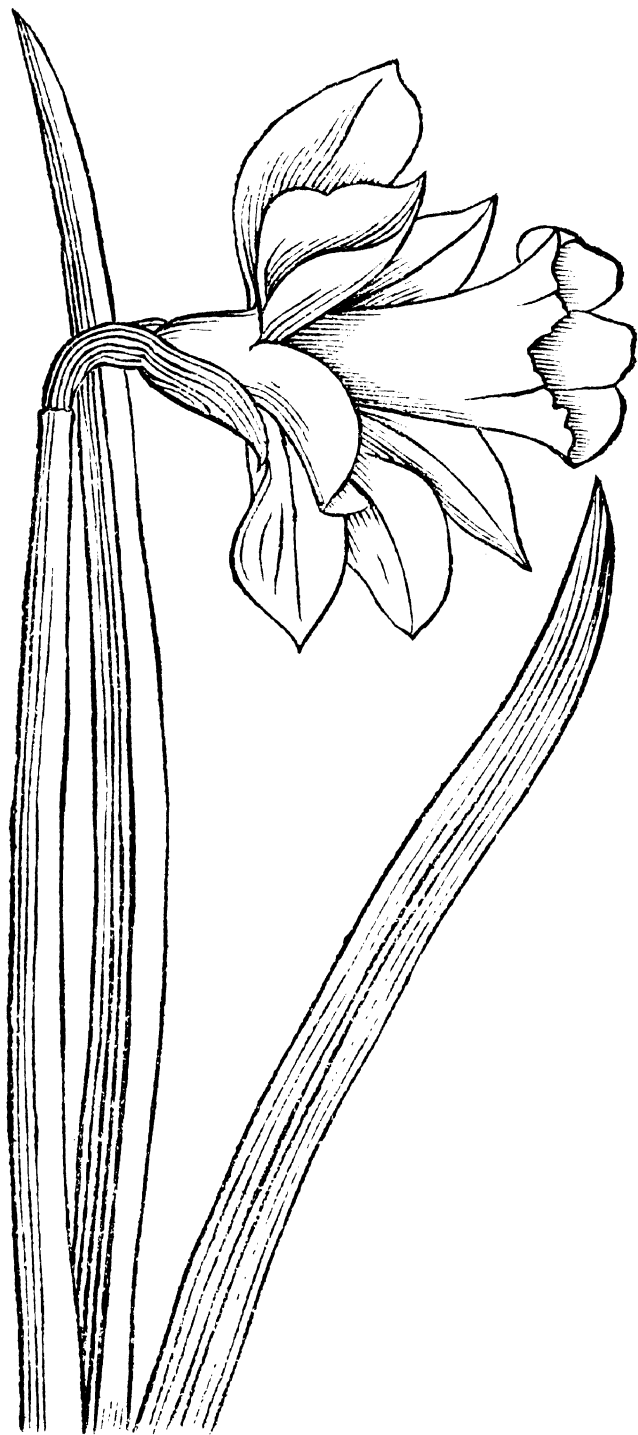


FIG. 13.—" NARCISSUS MAJOR LUTEUS CALICE PRAELONGO ALTER "
 (— N. HISPANICUS var. SPURIUS).

From O. RUDBECK'S *Campi Elysii* (1701).

[To face p. 49.

which is labelled "*Narcissus nanus*" by SYME himself, accord with the accounts of HAWORTH and HERBERT, and the latter's drawing.

At Kew there exists a single flower sent by BARR in 1873 with several others for naming which seems identical with that in Herb. Fielding and Herb. Manchester. It was stated by BARR to belong to a form sold by the Dutch as *N. minor*, and he suggested that "seeing we have an illustrated *minor* and a better thing, a name is desirable." The flower was determined at Kew as *N. lobularis*, which is the Tenby Daffodil. But BARR's flower is much smaller than that of this species, and was probably much paler, and it is difficult to understand why this name was given. In 1884, in Ye Narcissus (pp. 34, 35) BARR included a form *lobularis* under the group *Pseudo-Narcissus*, presumably for the plant so determined at Kew, and a form *nanus* under the group *minor*. In describing the former he mentions the colour of the flower only, but the latter is described as having comparatively broad perianth-segments and is figured as a short, broad flower that recalls the early specimens at Oxford and Manchester, and also the Dutch flower that Kew had named *lobularis*. In this pamphlet BARR contrasts the squat flower of *N. nanus* with the narrower, more graceful blossom of *N. minor*. A year later W. B. HARTLAND, in his Little Booke of Daffodils (pp. 6, 7), catalogued a *nanus* (*latifolius*) of English gardens and a *nanus* (*angustifolius*) of Irish gardens. The first of these seems to be the plant cultivated in Holland and figured by BARR, and the other is probably *N. minor*. NICHOLSON's Dictionary of Gardening, v. ii. (1886), furnishes two figures of *nanus*, one (f. 646) not quite certain but favouring a narrow-leaved form, and the other (f. 647) a reproduction of BARR's illustration. It is not easy to trace what happened in the immediately succeeding years, but before 1900 HARTLAND's *nanus* of English gardens, or a similar form, was being sent out by BARR and other English nurserymen as *N. lobularis*, and the name *nanus* was being applied to a narrow-leaved plant which is really *N. minor* L. Meanwhile, the plant sold in Holland in the early seventies as *N. minor* had become *N. nanus*. This naming has continued, so that at the present day the erect, broad-leaved form is the *lobularis* of BARR and some English nurserymen and the *nanus* of the Dutch and certain other English growers. There is no reasonable doubt, however, but that this plant matches the early specimens cited from Herb. Fielding and Herb. Manchester, and agrees with the accounts and figure of HAWORTH and HERBERT, and it is therefore held to be the original *A. nanus*.

This species is not known as a wild plant and awaits rediscovery.

8. NARCISSUS PARVIFLORUS (Jord.) comb. nov.

Ajax parviflorus Jordan, Icones Fl. Europ. iii, 4 (1903).

Icon. Jordan, l.c. t. 366.

Bulb of moderate size, ovoid, about 30 mm. long. Leaves erect, 25 cm. long, exceeding the scape, pale glaucous green, slightly channelled above and convex below, twisted, rather narrow (7-8 mm. broad), attenuate-obtuse. Scape 20 cm. long, erect, fairly compressed, finely striate. Pedicel curved, ascending, 15-20 mm.

long. *Flower small, drooping*, 30 mm. long (excluding ovary), *cream-coloured with yellow tube and golden-yellow corona*; *perianth-tube rather short* (9 mm. long); *perianth-segments ovate-lanceolate*, acute or acuminate, or the inner oblong, obtuse and apiculate, scarcely imbricated, ascending, waved and somewhat twisted, rather shorter than the corona; *corona straight, subcylindrical, not expanded above*, with suberect margin very obscurely crenate-lobate. *Filaments inserted 4-5 mm. above base of perianth-tube*. Capsule about 15 mm. long, rotund-ellipsoid, obtuse, terete and not trigonous, furrowed. [n.v.]

This very distinct, small-flowered Daffodil was discovered near Gèdres, in the French Department of Hautes-Pyrénées. The description has been adapted from JORDAN's account and the excellent plate by which it is illustrated.

N. parviflorus grows in the vicinity of *N. abscissus*, which it somewhat resembles in habit and the form of its corona. The arrangement of the stamens, however, is widely different, and in the present state of our knowledge it seems best placed among the *Minores*.

Series II. *Lutei*.*

Flowers small to large, deep yellow or golden (paler in *N. pisanus*), with the flowering pedicel not deflexed and rarely very short. Capsule more or less oblong-obovoid, trigonous.

9. NARCISSUS HISPANICUS Gouan (fig. 3 G).

Narcissus hispanicus Gouan, Illustr. Bot. 23 (1773); *N. major* Curtis, Bot. Mag. No. 51 (1788); Haw. in Trans. Linn. Soc. v, 243 (1800); Willk. and Lge. Fl. Hisp. i, 152 (1861); *N. grandiflorus* Salisb. Prodr. Stirp. 221 (1796); *Ajax grandiflorus* Salisb. in Trans. Hort. Soc. i, 344 (1812); *A. major* Haw. Narciss. Revis. 116 (1819); Mon. 4 (1831); *A. luteus* var. *major* Herbert, Amaryll. 304 (1837); *N. Pseudo-Narcissus* subsp. *N. major* Baker, Amaryll. 4 (1888); *N. Pseudo-Narcissus* subsp. *N. sylvestris* race *N. major* Rouy, Fl. France, xiii, 30, excl. var. β (1912); *N. major* and *N. maximus* hort. recent. pro maj. parte.

Pseudo-Narcissus aureus praecox Hort. Eystt. 3rd Ord. f. 6 (1613); *N. major totus luteus calice praelongo* C. Bauh. Pin. 52 (1623), ex parte; Ray, Hist. 1130 (1688); Rudbeck, Camp. Elys. 71, f. 9 (1701); *P. aureus hisp. maximus* Park. Par. 99 (1629); *N. hisp. luteus major amplo calice* Theatr. Fl. pl. 20 (1633).

Icones. Hort. Eystt. l.c.; Theatr. Fl. l.c.; Rudbeck, Camp. Elys. l.c.; Bot. Mag. t. 51; Nees and Sinning, Samml. Schönblüh. Gewächs. t. 31, as *N. major* (form with short pedicel).

Exsicc. Hort. Soc. Hort. Lond., 1834, in Hb. Kew. and Hb. Lindley, as *N. major*; Hort. H. S., 1824, in Hb. Fielding, as *N. major*; Forbes Young, Ruxley Lodge, 1851, in Hb. Kew., as *N. major*; Gadeceau, cult., Le Cellier, Nantes, 1906, in Hb. Mus. Brit., as *N. major*.

Bulb of moderate size or rather large, ovoid, 40-50 mm. long, with brown scales. *Leaves erect*, 40-50 cm. long, glaucous, flat and more or less spirally twisted, 10-12 mm. broad, obtuse, attenuate above. *Scape 40-60 cm. long* (rarely -90 cm.), erect, stout below but attenuate above, much compressed and acutely 2-edged, finely striate. *Pedicel* rather slender, erect but curved above, elongate (25-35 mm.). *Flower large*, suberect or nearly horizontal, 50-60 mm. long (excluding ovary), deep golden yellow and nearly concolorous, with green perianth-tube, sweetly scented; *perianth-tube rather short*, about 18 mm. long; *perianth-segments* oblong-lanceolate, subacute, very slightly imbricated below, spreading-incurved, regularly spirally twisted, as long as the corona; *corona* slightly hexagonal, with an abruptly dilated and widely spreading margin (about 45 mm. across), which is obscurely lobed, deeply crenate-dentate and irregularly

* Flores parvi ad magni, saturate lutei vel aurei (in *N. pisanus* pallidiores), pedicello florifero haud deflexo raro brevissimo. Capsula plus minusve oblongo-obovoidea trigona.

plicate-recurved. Stamens and style relatively short; filaments inserted 3-4 mm. above base of perianth-tube; anthers with minute dark apical spot. Capsule 20-30 mm. long, oblong-ellipsoid, bluntly trigonous with shallow furrows. Chromosome number 21 (Philp).

β. *propinquus* (Herb.) comb. nov.

N. propinquus Salisb. Prodr. Stirp. 221 (1796), excl. syn.; *N. major* var. β Ker in Bot. Mag. No. 1301 (1810); *Ajax laciniolaris* Salisb. in Trans. Hort. Soc. i, 344 (1812); *A. propinquus* Haw. Narciss. Revis. 115 (1819); Mon. 3 (1831); *A. luteus* var. *propinquus* Herbert, Amaryll. 304 (1837); *N. major* hort. recent. (partim).

P. major hispanicus totus luteus Merian, Floril. Ren. t. 15 (1641)?

Icones. Bot. Mag. t. 1301 β; Reichb. Icones Fl. Germ. ix, f. 817, lower flower, as *N. major*.

Exsicc. Pommaret, Rangouse, près l'Agen, 1831, in Hb. Kew., as *N. major*; Forbes Young, Cobham Lodge, 1853, in Hb. Kew.; T. Moore, Chelsea, 1852, in Hb. Kew.; *N. propinquus*, without data, in Hb. Fielding.

Leaves less twisted than in the specific type. Scape rather less compressed; pedicel shorter (15-25 mm. long), often stouter, but little curved. Flower sub-erect or horizontal, 50-65 mm. long, golden-yellow with perianth-tube and base of segments flushed with green, sweetly scented; perianth-tube 15-20 mm. long; outer perianth-segments oblong, inner oblong-lanceolate, all obtuse, mucronulate, very little imbricated, suberect-incurved, slightly twisted, irregularly undulate, as long as the corona or nearly so; corona gradually dilated above, with erect-spreading margin (up to 40 mm. across), which is cut into six unequal, contiguous, irregularly crenate-dentate, longitudinally plicate lobes; interior of corona transversely rugulose. Capsule 20-28 mm. long, oblong, very obtuse, bluntly trigonous with flattish sides, scarcely furrowed. Otherwise like the type. Chromosome number 14 (Philp).

γ. *spurius* var. nov. (fig. 13).

Ajax spurius Haw. Syn. Pl. Succ. App. 327 (1812); Narciss. Revis. 115 (1819); Mon. 3 (1831).

N. major luteus calice praelongo alter Rudbeck, Camp. Elys. 72, f. 9 (1701).

Icon. Rudbeck, l.c.

Exsicc. Gadeceau, cult., 1905, in Hb. Mus. Brit.

Dwarfer than the preceding. Scape about 30 cm. long. Pedicel rather short (about 15 mm.). Flower 45-55 mm. long; perianth-tube 15-20 mm. long; perianth-segments ovate-elliptic, subacute, imbricated below, ascending, undulate, as long as the corona; corona somewhat dilated above, distinctly 6-lobed, with obscurely crenate, subplicate lobes. Otherwise like the type.

δ. *concolor* var. nov.

Ajax concolor Jordan, Icones Fl. Europ. iii, 1 (1903).

Icon. Jordan, l.c. t. 355.

Exsicc. Herb. Syme, Le Luc, Var, in Hb. Manchester, as *N. major*.

Leaves not twisted, about 10 mm. broad. Scape not much compressed, rather slender, striate. Pedicel 15-20 mm. long. Flower horizontal, rather long and narrow, 50-65 mm. long, golden-yellow; perianth-tube about 15 mm. long; perianth-segments lanceolate-elliptic, erect-spreading, twisted, shorter than the corona; corona with spreading and deeply 6-lobed margin, lobes finely and elegantly crenate, not contiguous. Capsule oblong-ellipsoid, subtruncate, obtusely trigonous. Otherwise like the type. [v.s.]

N. hispanicus is easily recognized by its erect pedicels, and its deep golden flowers, usually of large size, with twisted perianth-segments and expanded corona, often elaborately lobed and plaited. Its stamens and style are relatively short, and its capsule usually oblong and trigonous.

This handsome Daffodil has been widely known in Europe as a garden plant since the latter part of the sixteenth century. It seems to be first noticed by LOBEL [Stirp. Hist. p. 62 (1576)], who mentions its large, wholly yellow or orange flowers; and it is distinguished

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and figured by DODONAEUS [Stirp. Hist. Pemptades, p. 227 (1583)]. It also appears as the Spanish single Daffodil in GERARD's Herball (1597). It has been generally identified with the *Pseudo-Narcissus major hispanicus* of CLUSIUS (Rar. Plant. Hist. ii. 165), stated to grow in meadows of Old Castile, but this is probably inaccurate, for CLUSIUS' plant is not large-flowered. According to GOUAN, its habitats are the Pyrenees and Monte Calcaris in the Cevennes. SALISBURY, in Trans. Hort. Soc. (*l.c.*), states that it grows wild plentifully in the mountains of L'Esperou, which appears to be the same station as GOUAN's Monte Calcaris. HERBERT (*l.c.*) gives it as found on hills near Limoges, in the south-west of France, but at some distance north of the Pyrenees. I have seen no certainly wild *exsiccata* that clearly belong to the typical form of this species as defined above, but at Kew there are two very large flowers that belong here, which were sent from Cork by HARTLAND BROS. as wild examples, but without any definite information as to locality. These were probably collected in the Pyrenees, where the plant has been obtained in quite recent years for horticultural purposes. WILLKOMM and LANGE (*l.c.*) consider *N. hispanicus* a plant of meadows and grassy places of the mountain region of the Pyrenees, Cantabria, Old Castile and Granada, but it is likely that the form occurring in the last two provinces may be that now separated as *N. confusus*. MERINO (Fl. Galicia, iii. 112) records *N. hispanicus* for the districts of Coruña and Pontevedra.

It would thus appear that *N. hispanicus* grows in South-West France and is scattered over a great part of Northern Spain from the Pyrenees to Galicia. ROUY (*l.c.*) only admits *N. hispanicus* as a naturalized plant in France, but it undoubtedly still exists as a native on the French side of the Pyrenees. A small form resembling typical *N. hispanicus* occurs also in northern Portugal and is known in horticulture under the name of 'Santa Maria.' A wild example in Herb. Kew (FONSECA, Fl. Lusit. No. 581, Serra da Estrella, 1879) may belong to this form.

Another specimen of interest in Herb. Mus. Brit. is a double-flowered form, labelled "*N. hispanicus* Gouan. Hb. Nolte. Misit Gouan. Lapeyrouse, 1807." This appears to be an authentic example of GOUAN's *N. hispanicus* A (*N. . . . multiplex calice carens*), but I judge from its stout scape and pedicel that it is not really a double-flowered example of *N. hispanicus*, but rather identical with the present-day English double Daffodil, which HAWORTH finally referred to another species, *A. lobularis*.

The name *A. Telamoni* (at first written *A. Telamon*), to which the common double form of gardens was first referred, originated in HAWORTH's Synopsis Plant. Succ. App. p. 326 (1812), to represent a large species with very broad leaves and yellow flowers longer than those of any other form. It was kept up by HAWORTH in the Revisio and in the Monograph, but as no synonyms were given and no authentic specimens are known, it is not possible, in view of the meagre description, to identify the plant with accuracy. Material under this

name in Herb. Gadeceau appears to be a rather small form of *N. hispanicus* near var. *propinquus*, but with a less cut corona. BARR and WOLLEY-DOD regarded *N. Telamonius* as allied to *N. Gayi* ("princeps" hort.). The common double Daffodil of our gardens, often named "*Telamonius plenus*," shows the strongly compressed scape which characterizes both *N. hispanicus* and *N. Gayi*, but its foliage is essentially different from that of either of these two species, and it is more probably a sport of some other Spanish Daffodil that was formerly collected.

N. hispanicus seems to grow also in Italy, where it is perhaps of ancient naturalization. There are specimens at Kew from Elba (MARTIN, 1794) and from Naples (JAN, No. 26, 1828).

In the explanation of plates (p. ix) of BURBIDGE's *Narcissus* it is noted that the plants from which the figures of this species were drawn were from two to three feet in height. This seems an enormous size for any wild species of the subgenus *Ajax*, but it is sometimes attained by a form of *N. hispanicus* grown in Ireland. BAKER, in a short article on British Daffodils in Journ. Bot. xxii. p. 194, gives the length of the scape of *N. major*, as exhibited at the Daffodil Show of April 1, 1884, as often $1\frac{1}{2}$ –2 feet. SALISBURY (Trans. Hort. Soc. i. 344) speaks of this species as a noble plant, and states that it requires rich, deep loam in cultivation.

The variety *propinquus* seems to have been regarded by the older writers as a cultivated form, and I can find no definite reference to any natural habitat. SALISBURY, in his original description (*l.c.*), states that it is a plant cultivated in Holland, and in Trans. Hort. Soc. (*l.c.*) remarks that it was grown by Dr. RICHARDSON at North Bierly in 1712. The *exsiccata* cited above (Pommaret, Agen), which is annotated by J. GAY as representing *N. major* β of Bot. Mag. t. 1301, may perhaps have come from a natural station, for Agen (Lot-et-Garonne) is adjacent to the Pyrenean region, where forms of this species are truly wild. I learn from Mr. P. R. BARR that he has lately received bulbs from the neighbourhood of Bayonne that are scarcely separable from var. *propinquus*.

In recent years the variety *propinquus* has been almost lost to horticulture, and is perhaps most nearly represented by the popular garden plant known as 'Golden Spur,' which is somewhat intermediate between the varieties *propinquus* and *spurius*, but larger-flowered than either. 'Golden Spur' is largely grown in Holland, and has been distinguished in Messrs. BARR's catalogues as "Native of the Netherlands." It was first exhibited at the Royal Horticultural Society in 1895, and I understand was propagated from bulbs found apparently wild on a Dutch estate near The Hague a few years previously. But these bulbs were almost certainly only naturalized, and relics, or possibly hybrids, of the older *propinquus* and other allied forms formerly cultivated.

There are good figures of *N. major* and *N. propinquus* in the collection of SALISBURY's MS. and drawings preserved at South Kensington.

The variety *spurius* was first described by HAWORTH (*l.c.*) from specimens which he saw growing in COLLINSON'S garden at Mill Hill. No synonyms were cited in the original account, but subsequently, in the Monograph, he quoted RUDBECK, Camp. Elys. 72, f. 9, which is a good figure that enables the peculiar characters of the plant to be appreciated. Through this figure the form subsequently sold by nurserymen under the name of "*spurius*" was probably correctly identified. In quite recent years this variety, which is rather dwarf and of neat and pretty habit, has been discarded in horticultural catalogues and it is no longer easy to obtain. It still grows, however, in old gardens, as at Kew and Hampton Court. A wild plant (BOURGEAU, Pl. d'Espagne, No. 2701, Leitariegas, Asturias, in Herb. Mus. Brit., as *N. major*) from Northern Spain resembles this variety, but has rather smaller flowers borne on short pedicels. There are similar Galician examples at Kew, collected by BARR.

The variety *concolor*, which is beautifully figured by JORDAN, resembles the cultivated form 'Golden Spur,' but differs in its slenderer flowers with the lobes of the corona distinct and exquisitely crenulated. JORDAN'S account is taken from plants growing in the south of France, at Le Luc, in the Dept. of Var.

N. major is occasionally cited in error as of LINN. Sp. Pl., ed. 2, p. 415. The name is not to be found in the Species Plantarum, and the mistake is apparently due to LINNAEUS' citation, under *N. bicolor*, of a second synonym from C. BAUHIN'S Pinax—*N. major totus luteus calice praelongo*—which presumably refers to this plant.

10. NARCISSUS LONGISPATHUS sp. nov.*

N. major var. *longispathus* Degen and Hervier in sched. (nomen).

Exsicc. Reverchon, Pl. d'Espagne, 1906, No. 1415, Sierra de Cabrilla.

Plant tall. Bulb not seen. *Leaves erect*, 40–60 cm. long, green, *flat*, 10–15 mm. broad, obtuse but attenuate above. *Scape tall*, erect, *stout*, compressed, sharply 2-edged; *spathe* of variable length, *sometimes very long* (10 cm.) but never short. *Pedicel slender, erect, elongate*, 40–90 mm. long. *Flower rather small*, suberect or ascending, 35–45 mm. long (excluding ovary), *apparently deep yellow* and nearly concolorous; *perianth-tube short and rather broad*, 10–15 mm. long; *perianth-segments* ovate-elliptic or elliptic, cuspidate or acute, imbricated, erect-spreading, *apparently not twisted*, a little shorter than the corona; *corona rather broad, slightly dilated* but apparently little spreading above, with obscurely lobed and slightly crenate margin. Filaments inserted about 3 mm. above base of perianth-tube. Style rather long. *Capsule* (immature only seen) fully 20 mm. long, *oval-oblong, bluntly trigonous*. [v.s.]

N. longispathus is a remarkable Daffodil of the largest size, with small flowers recalling in form those of *N. obvallaris*, but borne on

* *Planta elatior. Folia erecta, viridia, complanata, 10–15 mm. lata, apice attenuata. Scapus altus, robustus, acute anceps; spatha interdum longissima (10 cm.) nunquam brevis. Pedicellus erectus, elongatus, 40–90 mm. longus. Flos satis parvus, suberectus vel adscendens, verisimiliter alte luteus fere concolor; perianthii tubo brevi latiusculo; segmentis ovato-ellipticis vel ellipticis, imbricatis, ut videtur haud tortis, quam coronā paulo brevioribus; corona latiuscula, superne paulo dilatata margine obscure lobato leviter crenato. Capsula ovali-oblonga, obtuse trigona.*

erect pedicels that are often of extraordinary length. It is evidently a member of the series *Lutei*, and is at once distinguished from every other species of the subgenus by the length of its spathe and pedicels.

It was found by REVERCHON in moist and shady places on calcareous ground at an altitude of about 5,500 feet on the Sierra de Cabrilla, which it is understood forms part of the Sierra de Cazorla, in the east of the Andalusian province of Jaen. REVERCHON remarks that it was the only form seen on the "Massif de la Malessa."

II. NARCISSUS OBVALLARIS Salisb. (fig. 3H).

Narcissus obvallaris Salisb. Prodr. Stirp. 221 (1796); *N. Sibthorpii* Haw. in Trans. Linn. Soc. v, 243 (1800); *N. major* var. γ Ker in Bot. Mag. No. 1301 (1810), excl. syn. partim; *Ajax obvallaris* Salisb. in Trans. Hort. Soc. i, 345 (1812); Haw. Narciss. Revis. 120 (1819); Mon. 3 (1831), pro parte; *A. lobularis* Haw. in Phil. Mag. viii, 130 (1830), pro parte; Mon. 3 (1831), pro parte; *A. luteus* var. *obvallaris* Herbert, Amaryll. 304 (1837); *N. Pseudo-Narcissus* var. β Bertoloni, Fl. Ital. iv, 18 (1833-54)?; *N. Pseudo-Narcissus* var. *Bromfieldii* Syme, Eng. Bot. ed. 3, ix, 158 (1869); *N. obvallaris* hort. recent.

Pseudo-Narcissus luteus Hort. Eystt. 3rd Ord. f. 7 (1613).

Icones. Hort. Eystt., l.c.; Bot. Mag. t. 1301 γ ; Reichb. Icones Fl. Germ. ix, f. 817, upper flower, as *N. major*; Garden, lxiii, p. 245; Gard. Chron. (N.S.) xxi, f. 80c; Butcher and Strudwick, Further Illust. No. 359.

Exsicc. Miller, sine loco, in Hb. Mus. Brit.; Bree, Tenby and Buildwas, in Hb. Mus. Brit., as *N. lobulatus* (sic); Hance, No. 1967/2, Salzburg, in Hb. Mus. Brit., as *N. Pseudo-Narcissus*; Pugsley, No. 468.

Bulb of moderate size, subrotund-ovoid, 25-35 mm. long, with pale brown scales. *Leaves erect*, 20-30 cm. long, glaucous, *flat* and not twisted, obscurely keeled, 8-10 mm. broad, slightly attenuate above, obtuse. *Scape* 20-30 cm. long, erect, more or less *stout*, 2-edged but not much compressed, coarsely striate. Spathe thick; *pedicel slightly curved*, stout to rather slender, 10-15 mm. long. *Flower of moderate size*, ascending or nearly horizontal, 35-45 mm. long (excluding ovary), *deep golden-yellow* and nearly concolorous except the perianth-tube more or less tinted green, slightly scented; *perianth-tube short and broad*, 12-15 mm. long; *perianth-segments broad* (inner narrower), ovate, obtuse, mucronate, *imbricated*, spreading, somewhat incurved and undulate but *not twisted*, shorter than the corona; *corona broad*, more or less longitudinally plicate, *dilated above* with spreading or slightly reflexed margin (25-30 mm. across), *with six well-marked, rounded lobes*, which are sometimes irregularly or sparingly undulate-plicate-crenate and sometimes subentire. Filaments inserted about 3 mm. above base of perianth-tube. Anthers with minute dark apical spot. Style relatively longer than in *N. hispanicus*. *Capsule* 20-25 (rarely -30) mm. long, *narrowly oblong or oblong-obovoid*, subtruncate, *obscurely trigonous* with flattish sides and scarcely furrowed. Chromosome number 14 (Philp).

β . *maximus* var. nov.

Ajax maximus Haw. Mon. 3 (1831), excl. syn.; Obs. in Phil. Mag. Ser. III, i, 276 (1832); *N. maximus* D. Don in Sweet, Brit. Fl. Gard. Ser. II, iii, No. 286 (1835), excl. syn.; *N. major superbus* T. Moore in Gard. Mag. Bot. 169 (1851)?; *N. 'Henry Irving'*, hort. recent.?

Pseudo-Narcissus major hispanicus De Bry, Floril. Nov. pl. 15 (1612); Passeus Hort. Florid. iv, No. 8 (1614); *Narcissus totus luteus montanus major* Hort. Eystt. 3rd Ord. f. 1 (1613).

Icones. De Bry, l.c.; Hort. Eystt. l.c.; Passeus, l.c.; Sweet, l.c. t. 286.

Larger in all its parts than the specific type, with broad, flat leaves and stout, ribbed, slightly compressed scape, sometimes 50 cm. long. Pedicel short (about 10 mm. long). *Flower large*, 50-55 mm. long; *perianth-tube short* (about 15 mm.) and broad; *perianth-segments elliptic-ovate*, inner narrower, all rounded-obtuse and mucronulate, imbricated, erect-spreading and undulate, rather shorter

than the corona; *corona* broad and dilated above with spreading margin (35-40 mm. across), with six obscure lobes, deeply and irregularly incised-crenate, plicate, undulate, internally faintly transversely wrinkled. *Capsule* 20-25 mm. long, broadly oblong or oblong-obovoid, obscurely trigonous and furrowed. Otherwise as the type.

γ. *toscanus* var. nov.*

Exsicc. Groves, Prope Florentiam, 1876, in Hb. Kew., and 1885, in Hb. Mus. Brit. (type), as *N. Pseudo-Narcissus* (*A. major* Parl.).

Leaves 10-12 mm. broad, attenuate above. Scape (-30 cm. long) and pedicel rather stout, the latter curved, 10-15 mm. long. Corolla 40-55 mm. long; *perianth-tube* 15-20 mm. long, rather broad; *perianth-segments* ovate-elliptic, obtuse, mucronulate, not twisted, shorter than the corona; *corona* broad, slightly expanded above (about 30 mm. across), with obscure, imbricate lobes and plicate-crenate margin. Otherwise as in the type. [v.s.]

δ. *concolor* var. nov.

N. Pseudo-Narcissus γ *concolor* Bromf. Fl. Vect. ii, 497 (1856); *N. Pseudo-Narcissus* var. *Bromfieldii* Syme, Eng. Bot. ed. 3, ix, 158 (1869), ex parte. *Exsicc.* Bromfield, Apse Farm, 1841, in Hb. Kew. and Hb. Manchester.

Scape stout; *pedicel* very short (5-7 mm.) and stout, sometimes nearly obsolete. Flower 35-45 mm. long; *perianth-tube* about 17 mm. long; *perianth-segments* broad and imbricated; *corona* broad, obscurely 6-lobed, with lobes more or less contiguous, plicate and strongly crenate. *Capsule* subrotund-obovoid, very obscurely trigonous. Otherwise like the type. [v.s.]

The forms brought together under *N. obvallaris* bear deep yellow, nearly concolorous flowers like *N. hispanicus*, but they differ in their generally lower stature, with flatter and less twisted leaves, less compressed scape, relatively broader and flatter *perianth-segments*, and broader and more simply cut *corona*. They represent the group *Lobato-coronae* of HAWORTH'S Monograph. The fruit of this species is more shortly pedicelled and less trigonous than in *N. hispanicus*.

SALISBURY'S original description of *N. obvallaris* (*l.c.*) runs "Corollae laciniis tubo $\frac{1}{2}$ -longioribus, rectis, ovatis, interioribus multo angustioribus, valde imbricatis; coronâ infundibuliformi basi cylindraceâ, 6-fidâ, repando-dentatâ, superne plicatâ," with *Pseudo-Narcissus luteus* Eystt. shown as a synonym; and he adds that he received the plant from CURTIS. In Trans. Hort. Soc. (*l.c.*) he gives as synonyms *N. major* γ of CURTIS' Bot. Mag. No. 1301, and *N. Sibthorpii* Haw. Neither CURTIS nor HAWORTH cites *N. obvallaris* in synonymy. HAWORTH, like SALISBURY, had this plant from CURTIS, who informed him that it was found wild in Oxfordshire by SIBTHORP. SALISBURY also states that it was received through SIBTHORP, but that it was not a wild plant; and he remarks that it had been called Bobart's Daffodil at Oxford and was probably introduced by the younger BOBART, as it is not mentioned in the second edition of the Catalogus Horti Oxoniensis published in 1658.

There is no figure of *N. obvallaris* in the collection of SALISBURY'S

* Folia 10-12 mm. lata, superne attenuata. Scapus pedicellusque (curvatus, 10-15 mm. longus) crassiusculi. Corolla 40-55 mm. longa; perianthii tubus 15-20 mm. longus satis latus, segmenta ovato-elliptica, obtusa, mucronulata, haud torta, quam corona breviora; corona lata, superne paulo dilatata, lobis obscuris imbricatis marginibusque plicato-crenatis praedita.

drawings at South Kensington, but there is a specimen there from Herb. Miller, marked in SALISBURY'S handwriting "*obvallaris* Salisb. Prodr." This consists of two flowers, now badly damaged by insects, but it can be seen that the perianth-segments are broad and imbricated, and the corona broad with spreading, little cut lobes. It may be the plant figured in Bot. Mag. as *N. major* var. γ , but this is not certain, and in view of its present fragmentary condition, and as no other authentic example is known, it seems desirable to regard the figure (Bot. Mag. t. 1301, γ) as typifying *N. obvallaris* Salisb. There is another specimen in Herb. Mus. Brit. that seems to match the *N. obvallaris* of Herb. Miller, from Salzburg, where it was presumably cultivated.

In horticulture the name *obvallaris* has been applied to the Tenby Daffodil for many years. It is not quite clear how or when the practice arose, but it is perhaps connected with the use of the name *lobularis* for *N. nanus*, which was suggested to BARR from Kew in 1873. But in 1884 BAKER gave an account of the Tenby Daffodil as *N. lobularis* in Journ. Bot. xxii. p. 193; and there are specimens so named at Kew, taken from the Daffodil Conference of April 1, 1884, although contemporary horticultural lists show the Tenby Daffodil as *N. obvallaris*. The name *A. lobularis* originated with HAWORTH in 1830, as cited above, and his original diagnosis, which is supplemented by a lengthy description, runs thus: "Corollae laciniis luteis tubo obconico exacte duplo longioribus; coronâ perluteâ patulâ sexlobatâ (lobis integris) lacinias 3-lineas superante. . . . Obs. Prope *A. obvallarem* Salisb., cui maxime affinis certe locarem. Differt satis flore omni parte longiore. Novam speciem constituit; et forte affinium *A. spurio* nob. cum coronae lobis longissime integrioribus." The plant was received from the Rev. A. T. BREE and was said to grow at Truby, which was corrected to Tenby in the Monograph. There is a contemporary specimen in Herb. Borrer at Kew, labelled "*Ajax lobularis* Haworth, Wales. Mr. Bree, Mr. Sowerby, 1829," which is clearly the Tenby Daffodil. HAWORTH distinguishes his plant from *N. obvallaris*, and does not cite *N. major* var. γ of the Bot. Mag. either in the Philosophical Magazine or the Monograph. In the later work it is quoted under *N. obvallaris*.

A comparison of the Tenby Daffodil with the Herb. Miller specimen of *N. obvallaris* in Herb. Mus. Brit. shows that the two plants are much alike, but it may be doubted whether they are exactly identical, *N. lobularis* appearing a dwarfer, rather coarser plant with a shorter and broader flower. But the Tenby plant obviously matches *N. major* var. γ of the Bot. Mag. t. 1301, and hence there is good ground for regarding *N. obvallaris* Salisb. and *N. lobularis* Haworth as conspecific. It is noteworthy that at Tenby the normal plant grows mixed with numerous double and intermediate forms. An interesting account of this plant, with plates, by C. T. VACHELL ("*Narcissi of South Wales*"), may be found in Trans. Cardiff Naturalists' Society, xxvi. Pt. 2 (1894).

The variety *maximus* represents a larger form, having the general features of *N. obvallaris*, not known as a wild plant. DON's account of it (as *N. maximus*) seems to agree with his plate, but RUDBECK's plant cited (*N. totus luteus calice praelongo*) is a form of *N. hispanicus*, as is also *A. propinquus*. DON's figure shows a strong likeness to the pre-Linnean plants cited above, which apparently represent a form grown in the Netherlands from an early date. It also recalls the *Pseudo-Narcissus simplex Belga* of the Hortus Eystettensis, which, however, is more probably the wild *N. Pseudo-Narcissus*. The modern garden Daffodil 'Henry Irving,' which certainly resembles DON's figure, has been stated to be a native of the Netherlands, but is more probably, like 'Golden Spur,' a relic of former cultivation or possibly a resultant hybrid. It was discovered in a wild condition near Leiden, in Holland.

The variety *toscanus* is characterized by rather large flowers, with scarcely expanded and obscurely lobed corona; and the variety *concolor*, which is notable from having figured in botany, while it is not mentioned in horticulture, differs materially from the specific type in its longer perianth-tube, less distinctly lobed corona, and globose, almost sessile capsules.

Ajax cambricus, of HAWORTH's Monograph, p. 3, which is only very briefly described, is perhaps a form of this species allied to var. *toscanus*, but as HAWORTH furnished no synonyms and gave no indication of its origin beyond noting that it was a native of Wales, it is only possible to conjecture what its affinity may have been. No contemporary specimens are known to exist. There is a flower in Herb. Kew. of the plant that BARR considered to be *N. cambricus*. This has the appearance of a form of *N. hispanicus* or *N. confusus*, but is not really determinable.

It is notable that to none of the forms of this species has a Spanish origin been attributed. The specific type was at first thought to be wild in Oxfordshire. Later, as *A. lobularis*, it was found near Tenby, where it was abundant till collected by nurserymen and still grows in limited quantity. It was formerly known in other parts of Pembroke-shire and also in Salop, but its indigenuity in Britain must be held doubtful. It would seem, however, by no means impossible that an endemic form of a group eminently Lusitanian in its distribution might occur in South Wales. The example in Herb. Mus. Brit. from Salzburg is probably a cultivated plant. The large-flowered variety *maximus* was long grown in Holland, where it was almost certainly introduced, and nothing appears to be known of its real origin. The variety *concolor* came from the vicinity of Shanklin, Isle of Wight, but as it grew in the neighbourhood of an old farm it was probably at some time planted. It is believed to have become extinct. The Italian variety *toscanus* is recorded from cornfields near Florence and may be a native plant in the valley of the Arno. A specimen from this region, received through BARR, is at Kew in addition to those cited above.

12. *NARCISSUS PISANUS* sp. nov.* (fig. 4A).

Exsicc. Billot, No. 468 ter, as *N. Pseudo-Narcissus* (type) ; Pugsley, No. 469.

Bulb of moderate size, ovoid, 25–30 mm. long, with thin, pale scales. *Leaves erect*, 20–25 cm. long, flat and not twisted, 6–10 mm. broad, attenuate above, obtuse. *Scape* 20–30 cm. long, erect, rather slender and tapering above, fairly compressed, 2-edged, finely striate. *Pedicle* rather slender, suberect or inclined, short (5–8 mm. long). *Flower* of moderate size, ascending or horizontal, 45–48 mm. long (excluding ovary), clear yellow with slightly deeper corona ; *perianth-tube* rather narrow, 18–20 mm. long ; *perianth-segments* ovate-elliptic, obtuse, mucronate, imbricated below, erect-spreading, somewhat twisted, a little shorter than the corona ; *corona* rather broad, a little dilated and spreading above, with subuplicate margin divided into six rounded, contiguous, subentire or crenulate lobes. Style and stamens longer than in *N. hispanicus*. Filaments inserted 3–4 mm. above base of perianth-tube. *Capsule* (immature) 15–18 mm. long, oblong or oblong-obovoid, nearly terete, scarcely furrowed.

This graceful Daffodil is allied to *N. hispanicus* and *N. obvallaris*, which it resembles in its bright yellow, nearly concolorous flowers. It differs from both, however, by its shorter pedicel and its relatively longer perianth-tube. *N. hispanicus* may be further distinguished by its taller growth, twisted foliage, larger and more deeply coloured flowers with strongly twisted perianth-segments, larger and more cut corona, and short style and stamens ; *N. obvallaris* by its more robust habit, with stout scape and pedicel, and darker yellow flowers with broader and more spreading perianth. *N. longispathus* is readily separable owing to its tall, erect habit and elongate pedicels.

N. pisanus is an Italian plant that has been collected by BILLOT and other botanists on the slopes of Monte Pisano, in Tuscany, which seems to be a natural station where it is probably indigenous. There is also a specimen at Kew from the valley of the Arno (with both single and double flowers), received from BARR, which has the aspect of a luxuriant form of this species. In April 1927 I collected *N. pisanus* in grassland among the hills near Lugano, where it grew in the proximity of a deep yellow, double Daffodil, which is frequent in that district. This double Daffodil, though similar in flower, differs from the common "Telamonius plenus" seen in British gardens by its dwarfer growth and relatively slender scape and pedicel, and may well be the double form of *N. pisanus*. The species is probably widely distributed in Northern Italy.

13. *NARCISSUS CONFUSUS* sp. nov.†

Pseudo-Narcissus major hispanicus Clusius, Hist. ii, 165 (1601) ? ; Sweert, Floril. i. Pl. 21, f. 2 (1612) ? ; *Bulbocodium hispanicum* J. Bauh. Hist. ii, 594 (1651) ?

* *Folia erecta, plana, 6–10 mm. lata, superne attenuata. Scapus 20–30 cm. longus, superne gracilescens, tenuiter striatus. Pedicellus satis gracilis, suberectus, brevis. Flos mediocris, laete flavus ; perianthii tubus paulo angustus ; segmenta ovato-elliptica, inferne imbricata, erecto-patentia, paulum torta, quam corona paulo breviora ; corona latiuscula, superne paulo dilatata, margine in lobos rotundatos, subintegros diviso. Capsula oblonga vel oblongo-obovoidea, fere teres.*

† *Planta robusta. Folia erecta, saltem 30–35 cm. longa, viridia, complanata, ad 14 mm. lata, obtusa. Scapus folia subaequans, crassiusculus, anceps. Pedicellus crassiusculus, suberectus, circa 10 mm. longus. Flos satis parvus, suberectus vel adscendens, aureus ; perianthii tubus latiusculus ; segmenta ovato-lanceolata vel lanceolata, inferne imbricata, adscendentia, plus minusve torta, coronam subaequantia ; corona latiuscula, haud multo dilatata, obscure lobata. Capsula verisimiliter ovalis, vix trigona.*

Exsicc. Lacaita, Nos. 25966 (type) and 25967, Sierra de Majareina, Estremadura, 1923, as *N. major*.

Plant robust. Bulb rather large, ovoid, 35–45 mm. long, with pale brown scales. *Leaves erect*, at least 30–35 cm. long, green, flat, up to 14 mm. broad, obtuse. *Scape* subequalling the leaves, erect, rather stout, compressed and sharply 2-edged. *Pedicel* rather stout, suberect, about 10 mm. long. *Flower* rather small, suberect or ascending, 40–45 mm. long (excluding ovary), golden-yellow and nearly concolorous; *perianth-tube* rather broad, 15–18 mm. long; *perianth-segments* ovate-lanceolate or lanceolate, cuspidate or acute, imbricated below, ascending, more or less twisted, nearly equalling the corona; *corona* rather broad, not much dilated or spreading above, generally obscurely lobed, with plicate, imbricated, crenate-dentate margin. Style relatively longer than in *N. hispanicus*. Filaments inserted 3–4 mm. above base of perianth-tube. *Capsule* (immature only seen) at least 15 mm. long, apparently oval, scarcely trigonous. [v.s.]

N. confusus is allied to *N. hispanicus*, more particularly to the variety *spurius*, but it differs in its broader, greener and flatter leaves, and smaller, more shortly pedicelled flowers, with less lobed and cut corona, and relatively longer style. It also recalls *N. obvallaris*, which may be known by its dwarfer habit (excepting var. *maximus*), less erect pedicel, broader, spreading perianth-segments, and broader, more lobed or incised corona. *N. longispathus* is readily distinguished by its tall habit, with small, broad flowers borne on extremely long, erect pedicels. The Italian *N. pisanus* is a smaller and slenderer plant, with narrower leaves and lighter yellow flowers with an elegantly lobed corona.

This species is probably the prevalent Daffodil of Central Spain. It appears to be CLUSIUS' *Pseudo-Narcissus major hispanicus*, a native of Old Castile, which has been commonly but erroneously identified with *N. hispanicus* Gouan—an erroneous identification noticed by RAY (Hist. ii. 1130), who, under *N. hispanicus*, omits the citation from CLUSIUS and remarks, "flower far larger than in the Common Daffodil, hence we wonder that Clusius says smaller." SALISBURY (Trans. Hort. Soc. i. 346) also notices this discrepancy, and cites the plant of CLUSIUS as a synonym of *A. obvallaris*. CLUSIUS first mentions the occurrence of his Spanish Daffodil in meadows and damp places in Old Castile in 1576 (Rar. Stirp. Hisp. Hist. p. 255), and in his subsequent Historia (ii. p. 165) he compares it with the Common Daffodil, stating that its bulb is thicker, its leaves greener and far larger, its stem taller, and its flower a little smaller, with the perianth and corona of a uniform yellow or golden colour. From this account it will be seen that the plant of CLUSIUS cannot possibly be *N. hispanicus* Gouan, but agrees remarkably closely with *N. confusus*, as described above from Mr. LACAITA's specimens. These specimens were obtained in mountain pastures in Estremadura, a remote region where botanizing is not easy. Other material, e.g. WILLKOMM's No. 834, Sierra de Yunquera, N.E. Granada, may also be a form of *N. confusus*, but the examples at Kew and in Herb. Mus. Brit. are too fragmentary for determination. As suggested under *N. hispanicus*, the Common Double Daffodil of English gardens, to which a Spanish origin was first attributed, may possibly belong to this species.

14. *NARCISSUS PORTENSIS* sp. nov.*

N. Pseudo-Narcissus f. *stenantha* Lge. Diag. Pl. III in Overs. Vidensk. 193 (1893) ?; Willk. and Lge. Fl. Hisp. Suppl. 323 (1893) ?

Exsicc. Tait, Oporto, 1886, in Hb. Mus. Brit. (type) and Hb. Kew., as *N. Pseudo-Narcissus* var. *minor*; Gadeceau, Oporto, 1905, and cult. 1907, in Hb. Mus. Brit., as *N. obvallaris* ? and *N. abscissus* ?; James, Arzina, Galicia, 1926, in Hb. Lacaïta (No. 28949) as *N. hispanicus*.

Bulb rather small, subrotund, 25–30 mm. long, with pale brown scales. *Leaves suberect*, 8–12 cm. long, glaucous, *nearly flat*, about 6 mm. broad, obtuse, attenuate above, *much shorter than the scape*. *Scape* 12–20 cm. long, suberect, *slender*, compressed and 2-edged, finely striate. *Pedicel slender, curved above, rather short* (5–15 mm. long). *Flower of moderate size or rather small*, horizontal or ascending (penchée ap. Gadeceau), 40–55 mm. long (excluding ovary), *golden-yellow* and concolorous (ap. Gadeceau) with perianth-tube shaded with green and green median nerves to the segments; *perianth-tube long* (16–22 mm.), *narrowly obconical*; *perianth-segments narrow*, linear-lanceolate, lanceolate-subulate or lanceolate, acute, generally slightly imbricated below, apparently suberect, more or less waved, *distinctly shorter than the corona*; *corona large, straight*, gradually dilated upwards and without apical expansion (somewhat obconical or funnel-shaped), longitudinally plicate, the *subtruncate margin* very obscurely and obtusely 6-lobed or shortly incised-crenulate. Filaments inserted 4–5 mm. above base of perianth-tube. *Capsule* (immature only seen) apparently rather narrow, *oblong-obovoid*. [v.s.]

This Daffodil, which differs widely from the other species of the *Lutei* and is placed in this series with some doubt, is remarkable for its small, narrow perianth-segments and large, funnel-shaped corona, which, with its inclined flowers, give it something of the aspect of a *Bulbocodium*.

The plant has not been identified with any of the clipt-trunk Daffodils of the pre-Linnean writers and was not known to the generation of HAWORTH. The present description is based on specimens sent by A. W. TAIT from near Oporto and Povoá de Lanhoso to the Natural History Museum and to Kew, on others that were transmitted later by E. JOHNSTON to GADECEAU, who was puzzled over the plant's affinities, and on Galician material in Mr. LACAÏTA's Herbarium. JOHNSTON forwarded small- and larger-flowered specimens from natural habitats and cultivated ground respectively, and GADECEAU was disposed to assign the former to *N. minor* or *N. abscissus*, and the larger to *N. obvallaris*. At the same time he remarked the superficial resemblance to a *Bulbocodium*. Although there is a marked difference in the development of the flowers, all of these specimens, as seen when dry, appear to be states of one species, which has not hitherto been described, and which, by the form of its perianth and corona, is separable alike from *N. minor*, *N. abscissus* and *N. obvallaris*. There is also in Herb. Manchester a specimen from Sierra de Cintra (WELWITSCH, Fl. Lusit. No. 996, as *Narcissus* ?) which probably belongs to *N. portensis*. It shows similar short and narrow foliage, but the perianth-

* Folia suberecta, glauca, fere plana, circa 6 mm. lata, superne attenuata, quam scapus multo breviora. Scapus 12–20 cm. longus, gracilis, tenuiter striatus. Pedicellus gracilis, superne curvatus, breviusculus. Flos mediocris vel satis parvus, horizontalis vel adscendens, aureus; perianthii tubus longus, anguste obconicus; segmenta angusta, lanceolata, acuta, quam corona plane breviora; corona magna, recta, superne sensim dilatata, infundibuliformis, margine subtruncato obscurissime 6-lobato vel breviter inciso-crenulato. Capsula oblongo-obovoidea.

segments, though short, are elliptical and imbricated. COUTINHO [Fl. Portugal, 141 (1913)] gives a form *concolor* of *N. Pseudo-Narcissus*, which is perhaps intended to include this plant, but no point of distinction is mentioned other than the uniformly yellow flower.

No material has been seen of LANGE's form *stenantha* of *N. Pseudo-Narcissus*, shown above in the synonymy of *N. portensis*, but judging from the description (*l.c.*), "Flore suberecto, perigonii laciniis linearilanceolatis coronâ obconicâ v. infundibulari crenatâ conspicue brevioribus," it appears to be identical with *N. portensis* in its essential features. Its recorded habitat is the Sierra de Guadarrama, where it was noticed in 1892, and it would thus seem likely that the range of the species extends from Galicia, Oporto and perhaps Lisbon eastwards across Portugal to the neighbourhood of Madrid.

15. NARCISSUS NEVADENSIS sp. nov.*

Exsicc. Lofthouse, Dornajo, Sierra Nevada, Prov. Granada, 1931, in Hb. Mus. Brit.

Plant dwarf. Bulb not seen. Leaves 12–15 cm. long, green, nearly flat, 5–6 mm. broad, obtuse, slightly attenuate above. Scape 15–25 cm. long, erect, compressed, plainly 2-edged. Spathe very long (up to 50 mm.). *Pedicel very long* (–28 mm.), *erect but curved at the extreme apex.* Flower small, suberect or ascending, 30–38 mm. long (excluding ovary), apparently full yellow with golden corona; *perianth-tube long* (about 18 mm.), *subequalling or even exceeding the corona*; *perianth-segments* oblong-lanceolate, acute or mucronate, slightly imbricated below, ascending, not twisted, *subequalling the corona*; *corona short, broad, straight, subtruncate*, with margin not expanded or lobed but irregularly undulate-crenate or slightly lobulate. Filaments inserted 4–5 mm. above base of perianth-tube. Style rather long. *Capsule* (immature only seen) about 12 mm. long, oval, apparently not trigonous. [v.s.]

In its long, erect pedicels *N. nevadensis* recalls *N. longispathus*, which was found at a similar altitude in the adjoining province of Jaen, but not only is it a plant of dwarf instead of luxuriant growth, but its flowers are widely different by their long perianth-tube and subtruncate corona, and resemble most closely those of *N. portensis*. It is not certain, in the absence of better material, what is the plant's closest affinity, but it appears to be allied both to *N. portensis* and *N. longispathus*, and to be best placed in the series *Lutei* despite its dwarf growth and small flowers.

The above description is based on limited material collected by Mr. LOFTHOUSE on April 6, 1931, on stony ground above Cortijo, near Monachil, in the district of Dornajo, Prov. Granada, at an altitude of 5–6000 feet. The discovery is of great interest, for hitherto no true Daffodil has been found in the Sierra Nevada. Mr. LOFTHOUSE was unfortunately unable to obtain bulbs, and of the three scapes which were preserved one bears two flowers. This is perhaps only an abnormality.

* *Planta nana.* Folia viridia, satis complanata, 5–6 mm. lata, apice attenuata. Scapus 15–25 cm. longus, anceps; spatha longissima (ad 50 mm.). Pedicellus longissimus (ad 28 mm.), erectus, apice ipso curvatus. Flos parvus, suberectus vel adscendens, ut videtur coronâ aureâ saturate luteus; perianthii tubus longus, coronam subaequans; segmenta oblongo-lanceolata, coronam subaequantia; corona brevis, lata, recta, subtruncate, margine nec expanso nec lobato. Capsula ovalis, verisimiliter haud trigona.

The figure of *N. hispanicus tubâ non fimbriatâ* of RUDBECK'S Camp. Elys. (p. 73, f. 15), on which HAWORTH'S *Oileus pumilus* is partly founded, somewhat resembles *N. nevadensis*.

Series III. *Vulgares*.*

Flowers of moderate size or rather large, yellow, straw-coloured or bicoloured, with the flowering pedicel very short and deflexed. Capsule broadly oval, subglobose or obovoid.

16. NARCISSUS PSEUDO-NARCISSUS Linn. (fig. 4 C).

Narcissus Pseudo-Narcissus Linn. Sp. Pl. 289 (1753); Eng. Bot. No. 17 (1790); Willk. and Lge. Fl. Hisp. i, 151 (1861); Baker, Amaryll. 3 (1888); Aschers. and Gräbn. Syn. Mitteleurop. Fl. iii, 371 (1905-7); Rouy, Fl. France, xiii, 29 (1912); *N. festalis* Salisb. Prodr. Stirp. 220 (1796); *Ajax festalis* Salisb. in Trans. Hort. Soc. i, 347 (1812); Haw. Narciss. Revis. 113 (1819); *Ajax Pseudo-Narcissus* Haw. Mon. 2 (1831); Herbert, Amaryll. 300 (1837).

Narcissus totus luteus montanus Theophr. Lobel. Stirp. Adv. 50 (1570); Stirp. Hist. 61 (1576); *N. luteus sylvestris* Dod. Pempt. 227 (1583); *N. totus luteus* Camer. Epit. 953 (1586); *Pseudo-Narcissus anglicus* Gerard, Herb. 115 (1597); id. ed. 2, 132 (1633); *Pseudo-Narcissus vulgaris* Clusius, Hist. ii, 164 (1601); *P. minor germanicus* Sweert, Floril. i, pl. 21, f. 3 (1612); *P. simplex Belga* Hort. Eystt. 3rd Ord. f. 6 (1613); *N. sylvestris pallidus calice luteo* C. Bauhin, Pin. 52 (1623); Ray, Hist. 1131 (1688); Rudbeck, Camp. Elys. 70, f. 8 (1701); *P. anglicus vulgaris* Park. Par. 100 (1629); *Bulbocodium vulgatius* J. Bauhin, Hist. ii, 593 (1651); *N. sylv. pallidus tuba lutea minor vulg.* Barrel. Pl. Obs. No. 929 (1714).

Icones. Gerard, Herb. ed. 2, l.c.; Rudbeck, Camp. Elys. l.c.; Barrel. l.c. No. 929; Eng. Bot. t. 17; Herbert, l.c. pl. 43, f. 3, as *A. festalis*; Bulliard, Herb. France, ix, t. 389; Fl. Danica, t. 2170; Baxter, Br. Bot. i, t. 73.

Exsicc. E. Foster, Low Leyton, 1799, in Hb. Mus. Brit.; Billot, No. 50; Godron, Nancy, 1846, in Hb. Kew.; Gay, Bois de Vincennes, 1861 and 1863, in Hb. Kew.; Monheim, Aachen, in Hb. Mus. Brit.; Murray, Val d'Illeiz, 1896, in Hb. Mus. Brit.

Bulb rather small, ovoid, 20-30 mm. long, with brownish scales. *Leaves erect*, 12-35 cm. long, *glaucous*, usually somewhat channelled, 6-12 mm. broad, attenuate above, obtuse. Scape 20-35 cm. long, erect, equalling or slightly exceeding the leaves, generally rather slender, moderately compressed, 2-edged, usually distinctly striate. *Pedicel* rather slender, *strongly deflexed*, *very short* (3-10 mm. long). *Flower small to rather large*, drooping or nearly horizontal, 35-60 (commonly about 45) mm. long (excluding ovary), *sulphur-yellow* or cream-coloured, *with* perianth-tube generally tinged with green and *bright yellow corona*, occasionally deeper towards the margin, strongly scented; *perianth-tube long* and rather narrow, 15-22 mm. long, occasionally nearly equalling the corona; *perianth-segments oblong-lanceolate to ovate-lanceolate or elliptic*, obtuse-mucronate, acute or more rarely acuminate, more or less imbricated below, ascending over the corona, waved and in well-grown plants often more or less spirally twisted, usually about as long as the corona but occasionally longer; *corona straight*, *scarcely expanded* or spreading at the margin, *without distinct lobes but cut irregularly into numerous short, dentate* (more rarely crenate or serrate) and subimbricate *lobules*, strongly plicate above and finely transversely rugulose within. Filaments, inserted 3-4 mm. above base of perianth-tube; anthers without dark apical spot. Style shortly exceeding stamens. *Capsule* 12-25 mm. long, *obovoid or subrotund*, or rarely oval-ellipsoid, very obtuse or subtruncate, *roundly trigonous* or nearly terete, often furrowed and *generally rugose*. Chalazal end of seed strongly appendiculate. Chromosome number 14 (Philp).

* Flores mediocres vel majusculi, lutei, straminei vel bicolores, pedicello florifero brevissimo deflexo. Capsula late ovalis, subrotunda vel obovoidea.

f. *lutescens* forma nova.*

Exsicc. Pugsley, No. 484.

Leaves 6–8 mm. broad. Flower rather large, 40–60 mm. long, with *perianth-tube* suffused with green and *clear yellow*, elliptic or lanceolate *segments* sometimes *nearly concolorous* with the corona. Corona generally rather broader than in the type, with more regularly rounded lobes and less plication.

β. *platylobus* var. nov.

A. platylobus Jordan, *Icones Fl. Europ.* iii, 2 (1903).

Icon. Jordan, *l.c.* t. 359.

Leaves 10 mm. broad. Flower about 50 mm. long; *perianth-segments* patent-ascending, imbricated below, *relatively broad*, ovate-elliptic, obtuse-mucronate; *corona rather broad, with margin* somewhat spreading, *unequally incised*, crenate-dentate. Capsule 20 mm. long, 6-furrowed but not trigonous. Otherwise as in the type. [n.v.]

γ. *festinus* var. nov.

A. festinus Jordan, *l.c.* 2 (1903).

Icon. Jordan, *l.c.* t. 360.

Exsicc. Reverchon, Briançon, 1868, in Hb. Kew. and Hb. Manchester.

Plant dwarf. Leaves narrow (about 7 mm. broad), *very glaucous*. Flower horizontal, rather small (40–45 mm. long), *with longer pedicel* than in the type; *perianth-segments* oval, subobtuse, imbricated; *corona deep yellow, with abruptly dilated*, spreading, crenate-lobate margin. Capsule about 20 mm. long, oblong (relatively narrow), obtusely trigonous. [v.s.]

δ. *porrigens* var. nov.

A. porrigens Jordan, *l.c.* 3 (1903).

Icon. Jordan, *l.c.* t. 361.

Plant dwarf. Leaves narrow (about 6 mm. broad), *very glaucous*, attenuate above. Flower horizontal, rather small (about 40 mm. long); *perianth-segments* oblong or lanceolate, apiculate, not imbricated, twisted; *corona deep yellow, with expanded*, spreading, distinctly lobed and crenate margin. Capsule 15 mm. long, oblong-ellipsoid, obtusely trigonous. [n.v.]

ε. *montinus* var. nov.

A. montinus Jordan, *l.c.* 3 (1903).

Icon. Jordan, *l.c.* t. 362.

Exsicc. Rel. Maillancae, No. 1722.

Leaves longer than the scape, about 8 mm. broad. Flower horizontal, 40–55 mm. long, with perianth-tube 20–25 mm. long and segments spreading, oval-elliptic, obtuse-mucronate; *corona with expanded margin, deeply divided into* six unequally crenate lobes. Capsule ellipsoid, slightly trigonous. [v.s.]

ζ. *minoriformis* var. nov.†

Exsicc. Fourcade, Mail du Cric, in Hb. Mus. Brit., as *N. minor* (type); Durieu, Mail du Cric, 1861, in Hb. Kew., as *N. —*.

Plant dwarf. Bulb small, 20 mm. long. Leaves generally 2, 10 cm. long, 5 mm. broad. Scape 10–15 cm. long, *very slender*. Pedicel *nearly obsolete*. Flower about 40 mm. long, *pale yellow, nearly concolorous*; perianth-tube 18 mm. long; *perianth-segments* narrow, lanceolate, a little shorter than the corona; corona with erect, irregularly serrate-dentate margin. Otherwise like the type. [v.s.]

* Folia 6–8 mm. lata. Flos majusculus, 40–60 mm. longus; perianthii tubus viridescens, segmenta elliptica vel lanceolata laete lutea nonnunquam cum coronâ fere concoloria; corona saepius quam typi paulo latior lobulis magis rotundatis minus plicata.

† Planta nana. Folia saepissime bina, 5 mm. lata. Scapus 10–15 cm. longus, gracillimus. Pedicellus fere obsoletus. Flos circa 40 mm. longus, pallide luteus, fere concolor; perianthii tubus 18 mm. longus, segmenta angusta, lanceolata, quam corona paulo breviora; coronae margo erectus, irregulariter serrato-dentatus.

η. humilis var. nov.*

N. scoticus hort. recent., non *A. festalis* var. *scoticus* Haw.

N. sylvestris pallidus calice longo luteo minor Rudbeck, Camp. Elys. 71. f. 8 (1701).
Icon. Rudbeck, *l.c.*

Plant dwarf. Leaves (6–8 mm broad) and scape 10–25 cm. long. *Flower small*, horizontal. 35–40 mm. long; *perianth-segments whitish, more or less spreading*; *corona yellow, irregularly serrate.* Otherwise as in the type.

θ. insignis var. nov.†

Exsicc. Pugsley, No. 487

Flower 40–55 mm long, with broader *perianth-tube* and *corona* than in the type: *perianth-tube* often suffused with deep yellow instead of green: *perianth-segments* cream-coloured, broadly ovate to elliptic-lanceolate, the inner narrower, all mucronate and strongly imbricated. *corona* broad and dilated at the margin (25–30 mm. across), variously crenate-lobate, less plicate than in the type. Capsule less obovoid than in the type, nearly terete, not rugose.

N. Pseudo-Narcissus was the only Daffodil distinguished by LINNAEUS in the first edition of *Species Plantarum* (p. 289), and there is little doubt respecting the plant intended although it is represented in his Herbarium solely by a double flower in rather poor condition. LINNAEUS' brief diagnosis (" *N. spatha uniflora, nectarii limbo campanulato erecto petalo æquale*"—slightly modified in edition 2) is of less importance than the two synonyms cited from C. BAUHIN and DODONÆUS, or the habitat which he gives " *In Angliæ, Hispaniæ, Italiæ nemoribus.*" The plant of C. BAUHIN's *Pinax*, *N. sylvestris pallidus calice luteo*, which LINNAEUS cites, was generally recognized by pre-Linnean authors as the light yellow Daffodil commonly found over a large part of Western Europe. It had already been independently named in Britain by GERARD, and later by PARKINSON, and it is of special interest to recall that CLUSIUS and J. BAUHIN (*l.c.*) mention it as growing commonly round London, and that the flowers were sold in plenty by countrywomen in Cheapside, where the taverns were decorated therewith. A still earlier reference to its occurrence in England may be found in LOBEL's *Stirp. Adv. Nov.* p. 50 (1570). There is an early specimen in the Sloane Herbarium (H.S. 312, f. 56. No. 1) under C. BAUHIN's name. RAY (*l.c.*) follows C. BAUHIN in designating the plant, and identifies with it the *Pseudo-Narcissus anglicus* of GERARD, and the *P. anglicus vulgaris* of PARKINSON. RUDBECK, who figured it (*l.c.*), likewise knew it under the same name. There is also the figure by BARRELIER (*l.c.*). No reasonable ground therefore exists in this case for questioning the application of the Linnean name.

In 1796 SALISBURY (*l.c.*) proposed the name *N. festalis* for a plant of which he gave as synonyms *N. Pseudo-Narcissus* Shaw in Eng.

* *Planta nana.* Folia (6–8 mm. lata) scapusque 10–25 cm. longi. Flos parvus, horizontalis, 35–40 mm. longus; perianthii segmenta albidia, subpatentia; corona lutea, irregulariter serrata.

† Perianthii tubus latus saepe alte luteo-tinctus potiusquam viridescens; segmenta lactea, late ovata ad elliptico-lanceolata, valde imbricata; corona lata, margine dilatato varie crenato-lobato. Capsula quam typi minus obovoidea, fere teres, haud rugosa.

Bot. 17; *N. bicolor* L. Sp. Pl. ed. 2, p. 415; and *Pseudo-Narcissus anglicus vulgaris* Park. This confused *N. Pseudo-Narcissus* with *N. bicolor*; and in Trans. Hort. Soc. (l.c.) SALISBURY corrected it by removing *N. bicolor* from the synonymy and substituting C. BAUHIN's name from RAY's Historia. *N. festalis* was thus left a still-born name for *N. Pseudo-Narcissus* L. There is an authentic specimen in Herb. Mus. Brit. of *N. festalis*, written up by SALISBURY, consisting of two small plants that may belong to the variety *humilis*.

Another species and some varieties that appear to belong to *N. Pseudo-Narcissus* were created by HAWORTH. In Dissertationes, p. 179 (1803), *N. serratus* will be found, based on a plant seen in an old garden in Hackney. The distinguishing features are flat, rather broad leaves and a "nectarium luteum apice recto inaequaliter serrato vel subinciso." In the Revisio it is said to grow at Mill Hill and to be evil-smelling, although possessing a sweet-scented variety, *suavis*, that grew sparingly with it. The account ends with the remark that it is perhaps a mere variety of *A. Pseudo-Narcissus*, but certainly larger and later in flowering. In the Monograph the description is abbreviated, but a second variety is added, *radians*, from its "subregulariter valde radianter serrata" corona. This variety was an earlier-blooming plant. HERBERT does not include *N. serratus* in his Amaryllidaceae, and as no synonyms were cited in either of HAWORTH's accounts, it remains a matter of conjecture how far the plant was essentially different from *N. Pseudo-Narcissus*. There is a specimen in Herb. Mus. Brit., from E. FOSTER's Herbarium (1849), labelled "*N. serratus*, Mill Hill, Mr. Chambers," which seems to be ordinary *N. Pseudo-Narcissus*. ROUY (l.c.) shows β *serratus* nob. under his subspecies, *N. silvestris* (Lamk.), with the synonym *N. serratus* Haw. The short description, however, does not seem particularly to characterize the variety as originally diagnosed, and a further synonym cited, *N. Pseudo-Narcissus* b. *grandiflorus* Lagr.-Foss. Fl. Tarn-et-Garonne, p. 382, apparently refers to a form of *N. hispanicus* Gouan.

In his Revisio HAWORTH also inserts under *A. festalis* (*N. Pseudo-Narcissus* L.) a variety *scoticus*, which came from Scotland and is notable for its "corona lutea ore magno expanso inciso-crenato." This variety is transferred to *A. lobularis* in the Monograph, where HAWORTH mentions that he had examined only one example. As the varietal name is founded on a meagre description, unsupported by synonyms or *exsiccata*, it cannot be taken up, and the plant intended does not seem to be identical with the form more recently sold by nurserymen as "*scoticus*," which is described above as var. *humilis*.

HAWORTH's Monograph contains three further varieties under *A. Pseudo-Narcissus*, viz. α *pallidus*, β *albis* (sic), and γ *luteus*, which represent only colour variations; and the diagnoses of α and γ are identical. Another variety, *ryticarpus* (capsulis rugosis), is included in HAWORTH's Monograph, Ed. 2, but this appears to be nothing more

than a state, very frequently seen in this species, in which the capsules are rugose instead of smooth—a feature that I have not observed in any other Daffodil except *N. nanus*.

In 1854 a late-flowering form of *N. Pseudo-Narcissus*, growing at Vrine, near Pontarlier, was named *N. Renaudii* by BAVOUX in Mém. Soc. Emul. Doubs, Sér. II, iv. 119. This was said to differ from ordinary *N. Pseudo-Narcissus* by its less trigonous fruits, with seeds of a different shape, but the plant does not appear to have been further described.

A number of Daffodils are carefully described and well figured with dissections in the posthumous third volume of A. JORDAN's *Icones ad Floram Europae*, published in 1903. Most of these are wild French plants and all of them are treated as separate species. Several are closely allied to *N. Pseudo-Narcissus* L., which, as might be expected in a widely spread species, is eminently polymorphic. The variability of the plants of the group *Vulgares* was noted long ago by PARKINSON, who suggested a name *Pseudo-Narcissus pyrenaeus variformis* to cover some of the Pyrenean forms. There are many such Daffodils, probably mostly wild plants, on the mound at Kew. It is clear from herbarium material that numerous races or strains of Daffodils of this group occur in France, and probably also in Spain, that differ only in minor characters from the average Linnean species, *N. Pseudo-Narcissus*, as described above. The points of distinction between such plants, though real and perhaps constant, often cannot be regarded as of specific value, and four of JORDAN's species have accordingly been reduced here to varieties of *N. Pseudo-Narcissus*. This has been done with some confidence, for the descriptions and plates together furnish fairly complete accounts of the plants, very different from the meagre notes, sometimes supported by synonyms or contemporary specimens but often with none, by which the names of HAWORTH and HERBERT have to be determined.

In Britain, likewise, the species in different localities seems to show more than simple individual variation. In Derbyshire and South Scotland a distinct, dwarf form is found with small, lightish flowers with somewhat spreading perianth and serrated corona. This has been sold by nurserymen in recent years as *N. scoticus*. In north-west Herefordshire a deeply coloured form with rather large flowers was collected and distributed (LEY, Eardisley, 1901) as *N. Pseudo-Narcissus* var. *lobularis* (Haw.), which it sometimes approaches in colour. Near Ross another large-flowered plant has been collected by Miss ARMITAGE, with a broad flower recalling *N. bicolor* but the long perianth-tube of *N. Pseudo-Narcissus*. With this plant, which has been distinguished as var. *insignis*, a curious form was found in moderate quantity in which the flower was normal, but the spathe not wholly membranous, its margin being green and herbaceous and its base tending in the same direction.

There is considerable variation apart from these more distinct forms. Woodland specimens are generally taller, with narrower

leaves and often paler flowers, than plants of open meadows. In some stations, where the species grows in profusion, there is a remarkable uniformity in its floral characters; in others the form of the perianth differs greatly in different individuals, as does also the marginal cutting of the corona. A large batch of specimens received from a single station in Herefordshire included flowers with broad and with narrow perianth-segments, with narrow, almost laciniate-fimbriate coronas and with broad, simply crenulate ones; some flowers were much more concolorous than others; and among them was a solitary example with a relatively short perianth-tube, markedly bicoloured flower, and spreading corona, which, seen alone, might have been supposed to belong to another species! There is also considerable variation in the form of the fruit. It may thus be seen how necessary it is to consider the ensemble of characters when attempting to determine the real status of any of these plants.

As might be expected, *N. Pseudo-Narcissus* is by far the most widely spread species of the Subgenus *Ajax*. According to NYMAN its range extends from Portugal across Europe to Central Germany, Austria, Hungary, Transylvania, Croatia and Dalmatia, while it also occurs naturalized in North Germany, Denmark and South Sweden. This range needs some curtailment. *N. Pseudo-Narcissus* is widely distributed as a native plant in France, whence it extends to England, Belgium, Germany (west of the Rhine), Switzerland, Northern Italy, and apparently the Tyrol, for there are specimens in Herb. Kew. from Stans, received from KERNER, who thought the plant spontaneous. In the Iberian Peninsula the distribution of this species is little known, for it has not been generally distinguished from *N. macrolobus* or *N. nobilis*. An example at Kew from La Granja (ELLMAN and HUBBARD, No. 1089) seems referable to *N. Pseudo-Narcissus*, as does also some of the Portuguese material sent out by GRAELLS. Beyond this range Daffodils are reported only as naturalized plants in the Floras of Austria, Hungary, Transylvania and Croatia; and it is likely that they are old garden plants distinct from the restricted *N. Pseudo-Narcissus*. The most eastern specimens that I have examined are from Salzburg (*N. obvallaris*), and from Kreutz, in Croatia (SCHLOSSER)—a form near *N. bicolor* var. *lorifolius*. In VISIANI's Flora Dalmatica *N. Pseudo-Narcissus* is recorded for stony, sunny places at Breno, south of Ragusa. This record indicates a natural habitat, which would be of much interest, but when at Ragusa in the spring of 1930 I was unable to find the plant or learn anything about it locally, although I visited Breno for this explicit purpose. I have not yet been able to see any specimens from this station.

In Britain *N. Pseudo-Narcissus* is widely distributed throughout England, but in Scotland naturalized Daffodils only are apparently to be found. The form introduced at Blair Castle, Perthshire, which is represented at Kew, is *N. Pseudo-Narcissus*. DRUCE's Plant List gives twenty Irish vice-counties for this species, but PRAEGER and other Irish authorities do not admit it as a native of Ireland, and it is

not known whether any of the naturalized Daffodils of that country are really *N. Pseudo-Narcissus*.

Of the varieties, β *platylobus* was recorded by JORDAN from Lorraine (Dept. Vosges); γ *festinus* from Dauphiny (Dept. Isère) (it also occurs in Hautes-Alpes); δ *porrigens* from the neighbourhood of Lyons; and ϵ *montinus* from Mt. Pilat, in Dept. Loire. There are specimens in Herb. Manchester from Basle (FIESCHER, 1838), and from Bex (MEISSNER), that approach the first-named variety. The variety *minoriformis*, readily separable from *N. minor* by its short pedicel, grows in the Central Pyrenees, and also near Grasse, in the Maritime Alps, whence specimens were sent to GAY. These are discussed under *N. minor*. The variety *humilis* is a British plant that grows in Derbyshire and other counties in northern England, and is believed to have been naturalized in some spots in southern Scotland. The last variety, *insignis*, is described from the neighbourhood of Ross, in Herefordshire, and is known to grow also at Dymock, in Gloucestershire.

17. NARCISSUS PALLIDIFLORUS sp. nov. (figs. 4B, 14).*

N. pallidus praecox Barr in litt. in Hb. Kew. (1889); et hort. recent.

Pseudo-Narcissus pallidus praecox Park. Par. 99 (1629); *N. tot. alb. nutans amplata* Barrel. Pl. Obs. No. 953 (1714)?

Icones. Garden, xxv, p. 185 (as *N. pallidus praecox*); Nicholson, Dict. Gard. ii, f. 644 (as *N. pallidus praecox*).

Exsicc. Barr, Bayonne, 1889, in Hb. Kew., as *N. pallidus praecox*.

Bulb rather small, subrotund, about 25 mm. long, with pale brown scales. *Leaves erect*, 15–30 cm. long, *more or less glaucous*, flat, 6–10 mm. broad, obtuse, slightly attenuate above. Scape erect, subequalling leaves in length, rather stout and not much attenuate above, little compressed and obscurely 2-edged, coarsely striate. *Pedicel* not slender, *strongly flexed*, *very short*, 5–8 (rarely –10) mm. long. *Flower of moderate size*, drooping or horizontal, 45–55 (rarely –60) mm. long (excluding ovary), *cream- or straw-coloured*, with slightly deeper corona and perianth-tube suffused below with soft yellow, nearly scentless; *perianth-tube* 16–20 mm. long; *perianth-segments broadly oval*, imbricated below, obtuse-mucronulate or subacute, erect-spreading, more or less twisted, equalling or slightly shorter than the corona; *corona* rather broad, *abruptly dilated*, *spreading and recurved at its mouth* (about 30 mm. across), *which is 6-lobed*, sometimes more or less obscurely; lobes irregularly and usually sparingly incised and plicate with obscurely crenate, undulate margin. Filaments inserted 3–4 mm. above base of perianth-tube; anthers without dark apical spot. *Capsule* 20–25 mm. long, *subrotund-oval* or subrotund, *not trigonous*, with obscure broad and shallow furrows, *not rugose*. Chalazal end of seed obscurely appendiculate. Chromosome number 15 (Philp).

f. *asturicus* forma nova.†

N. asturicus Barr in litt. in Hb. Kew. (1889).

Exsicc. Barr, Asturias, 1889, in Hb. Kew., as *N. asturicus*.

* *Folia erecta*, 15–30 cm. longa, glauca, plana, 6–10 mm. lata. Scapus foliis subaequilongus, satis crassus, grosse striatus. Pedicellus valde deflexus, brevissimus. Flos mediocris, nutans, lacteus vel stramineus coronâ paululum saturatiore tuboque basin versus flavescens; perianthii segmenta late ovalia, inferne imbricata, obtuso-mucronulata, plus minusve torta, coronam subaequantia; corona latiuscula, marginem sexlobatum versus abrupte dilatata, patens, recurvata. Capsula subglobosa, nec trigona nec rugosa.

† *Folia* –8 mm. lata, quam in typo glauciora. Pedicellus –10 mm. longus. Flos paulo minor, pallidior, perianthii segmentis minus imbricatis coronam aequantibus praeditus; coronae margo minus patens et lobatus, tenuius crenato-dentatus.

Bulb about 20 mm. long. Leaves less erect, -8 mm. broad, more glaucous than in the type. Pedicel rather longer (-10 mm.). Flower rather smaller (45-50 mm. long) and paler, with perianth-tube 16-20 mm. long and less imbricated perianth-segments equalling the corona; *mouth of corona less expanded and lobed*, with more finely crenate-dentate, plicate margin. Otherwise like the type. [v.s.]

β. intermedius var. nov. (figs. 4B, 15).*

N. Poujastou Barr in litt. in Hb. Kew. (1889).

Exsicc. Barr, Haute-Garonne, 1889, in Hb. Kew., as *N. Poujastou* (type); Pugsley, No. 465.

Bulb ovoid, about 25 mm. long. Leaves 5-8 (rarely -10) mm. broad. Scape 15-20 cm. long. Pedicel 3-5 mm. long, *often nearly obsolete*. Flower 40-50 mm. long, nearly uniformly primrose-yellow with base of tube greenish (margin of perianth-segments rather paler), or occasionally with a deeper yellow edge to the corona; perianth-tube 15-20 mm. long; *perianth-segments oblong*, slightly imbricated, subacute-mucronate, *somewhat twisted*, suberect and falling over the corona, subequalling the corona in length; *corona a little dilated above* but not spreading, *with suberect*, obscurely lobed, irregularly *dentate-laciniate*, strongly plicate margin, transversely rugulose within. Capsule 12-15 mm. long, *subrotund-obovoid* or subrotund, subtruncate, nearly terete, not furrowed. Otherwise like the type.

This beautiful Daffodil cannot be identified with certainty in the works of any pre-Linnean author except PARKINSON, who (*l.c.*) describes it at some length, remarking that its flower is of one even colour "which usually we call a strawe colour," and with "the brims [of the corona] turned up a little, which maketh it seem the larger." He also notes the earliness of its flowering and that it was obtained in the Pyrenees. It is not among the forms figured in the *Paradisus*.

In the first half of the nineteenth century, when so many forms of Daffodils were distinguished by SALISBURY and HAWORTH, this plant remained unnoticed, and it was not until 1882 that it was reintroduced into cultivation by MESSRS. BARR with bulbs collected near Bayonne. In his list of Narcissi in *The Florist and Pomologist*, p. 91 (1884), BARR places this plant among the forms of *N. moschatus*, presumably owing to its pale flowers. It seems, however, to differ materially from *N. moschatus* and its allies in its broader perianth and corona, and still more in its very short, abruptly deflexed pedicel and subrotund fruit; and these features bring it nearer to *N. Pseudo-Narcissus*.

The three forms described above were sent to Kew by BARR in 1889, with an explanatory letter that is preserved with them. The plant taken as the specific type is the one that BARR considered such, and which clearly agrees best with PARKINSON'S account. The form *asturicus* is only slightly different, but the variety *intermedius* is much more distinct, and in form of flower scarcely differs from some states of *N. Pseudo-Narcissus*. In the letter referred to above BARR gives a second name, 'Bland Doré,' to this variety, and I learn from his son, Mr. P. R. BARR, that this was intended to indicate a form with

* Pedicellus 3-5 mm. longus, saepe subobsoletus. Flos fere concolor, primulinus, tubi basin versus viridescens, aut rarius coronae margine plus minusve luteo-tincto; perianthii segmenta oblonga, paulo imbricata, satis torta, coronam subaequantia. Corona superne paulo dilatata, haud patens, obscure lobata, margine suberecto dentato-laciniato. Capsula subrotunda, subtruncate, fere teres.

a yellow-edged corona that had been found near Bayonne. BARR does not mention this feature in his letter, and the plants usually sold by his firm as 'pallidus praecox' have borne nearly self-coloured flowers. Plants with yellow-edged coronas will be dealt with further under *N. moschatus*.

The range of *N. pallidiflorus*, so far as at present known, extends from the Asturias Mts. (possibly from Galicia) along the Pyrenees almost to the Mediterranean. The typical form grows in the Western Pyrenees, especially about Bayonne; f. *asturicus* was collected by BARR in the Asturias; var. *intermedius* in the Central Pyrenees in the Dept. of Haute-Garonne. In 1925 I found this variety growing in pine-woods and in swamps further east in the Pyrénées-Orientales. There is a specimen from Lago Enol, near Covadonga, Asturias, in Herb. Lacaita (No. 28951, as *N. moschatus*), that shows the narrow foliage and the flowers of var. *intermedius*, but its pedicels are distinctly longer (~15 mm.) and its capsules undeveloped, so that it is uncertain whether it belongs to this species.

* *N. pallidiflorus* appears to increase but little by bulb division both when wild and under cultivation. The individuals that I observed in the Pyrenees mostly grew singly and never in large clumps, and bulbs in grass in my garden have flowered regularly for over thirty years without ever dividing. Although it often flowers in February in English gardens (in 1932 the first flower of var. *intermedius* opened on January 17) this Daffodil is not always early-flowering, for it was still in bloom in the Pyrenees (6,000 feet alt.) in the first week of June, when the flowers of *N. poeticus* were beginning to open.

18. NARCISSUS MACROLOBUS (Jord.) comb. nov. (fig. 15).

Ajax macrolobus Jordan, Icones Fl. Europ. iii, 3 (1903).

Pseudo-Narcissus pyrenaicus hispanico et anglico similis (*P. pyrenaicus variformis*) Park. Par. 99 (1629), ex parte ?

Icon. Jordan, l.c. t. 364.

Exsicc. Pugsley, Nos. 479 and 480.

Bulb rather small, ovoid, 20–30 mm. long. Leaves erect, 15–25 cm. long, glaucous, nearly flat, 8–12 mm. broad, obtuse, attenuate above. Scape 15–25 cm. long, sometimes shorter than the leaves, erect, not much compressed, obscurely 2-edged, strongly furrowed. Pedicel deflexed, short (about 10 mm. long). Flower rather large, drooping or horizontal, 50–60 mm. long (excluding ovary), creamy white or ochroleucous, with yellowish tube more or less tinged with green, and sulphur- or lemon-yellow corona, nearly scentless; perianth-tube rather short, 15–20 mm. long, scarcely half as long as the corona; perianth-segments large, ovate-lanceolate, acuminate or obtuse-mucronate, imbricated, more or less twisted; ascending over the corona, subequalling the corona in length; corona more or less broad and expanded above, with spreading margin cut into shallow, rounded, crenulate, lightly plicate-rugose lobes. Filaments inserted 3–4 mm. above base of perianth-tube; anthers without dark apical spot. Capsule about 20 mm. long, oblong or broadly oval, very obtuse, slightly trigonous and furrowed, not rugose. Chalazal end of seed strongly appendiculate.

β. *pallescens* var. nov.* (fig. 4D).

Exsicc. Pugsley, No. 481.

* Pedicellus brevissimus. Flos stramineus, tubo coronâque paulo saturatioribus; perianthii segmenta obtusa, mucronata, spiraliter torta; corona lata, lobis patentibus, rotundatis complanatisve, tenuiter crenato-denticulatis. Capsula late ovalis vel obovoidea, haud trigona.

*Pedice*l very short (5–8 mm. long). *Flower* straw-coloured, with rather deeper tube and corona; perianth-segments obtuse-mucronate, spirally twisted; corona broad, with spreading, rounded or flattened lobes, finely crenate-denticulate, subregularly plicate and much transversely rugulose within. *Capsule* 20–25 mm. long, broadly oval or obovoid, not trigonous, obscurely furrowed. Otherwise like the type.

N. macrolobus is most closely allied to *N. Pseudo-Narcissus*, which it resembles in its short, deflexed pedicel and drooping flower. It differs in its broader foliage and more uniformly dwarf habit, in its usually lighter-coloured flowers, in its much shorter perianth-tube and more ample perianth-segments, and in its broader and more expanded corona with rounded, almost subentire lobes. As a rule, the flower is much more handsome than that of *N. Pseudo-Narcissus*.

The species was described and figured by JORDAN from plants found at St. Paul, in the Pyrénées-Orientales, and a form which I collected above Luchon, Haute-Garonne, in 1925 is clearly conspecific although not identical in all respects. There are many similar plants, probably wild individuals obtained in the Pyrenees, growing about the mound in the wild garden at Kew. Among these there is a considerable variation in colouring, some flowers having a full yellow corona, while in others the flowers are very pale and nearly concolorous, more or less agreeing with the variety *pallescens* described above. This variety is founded on plants growing in my garden, which were obtained about 1910 as '*pallidus praecox*,' and no doubt were collected in the Pyrenees, although the exact habitat is not now known. While resembling *N. pallidiflorus* in the colour of the flower, they differ essentially in its proportions, the perianth-tube being much shorter.

N. macrolobus is a native of the Eastern and Central Pyrenees, and is perhaps much more widely distributed. It has certainly often been collected for horticultural purposes, but rather curiously no specimens have been observed in herbaria other than my own gatherings. The plant was presumably included in PARKINSON'S *Pseudo-Narcissus hispanico et anglico similis* (*P. pyrenaeus variformis*).

Series IV. *Nobiles*.*

Flowers usually large, yellow or bicoloured, with the flowering pedicel neither deflexed nor very short. Capsule more or less ellipsoid.

19. NARCISSUS GAYI (Hénion) comb. nov. (fig. 4E).

Ajax Gayi Hénion ap. Jordan, *Icones Fl. Europ.* iii, 2 (1903); *N. princeps* hort. recent.

Icon. Jord. l.c. t. 357

Exsicc. Gay, Réserve, 1859, in Hb. Kew., as *N. Pseudo-Narcissus praecox*.

Bulb rather large, ovoid or subrotund, 35–50 mm. long, with pale brown scales. *Leaves* erect, 30–50 cm. long, pale green, channelled and obtusely keeled, 9–12 mm. broad, much attenuate above, obtuse. Scape 35–50 cm. long, erect, stout below and attenuate upwards, strongly compressed, 2-edged, finely striate. *Pedicel* rather slender, compressed, curved, short (10–15 mm. long). *Flower* large,

* Flores saepissime magni, lutei vel bicolores, pedicello florifero nec deflexo nec brevissimo. Capsula plus minusve ellipsoidea.

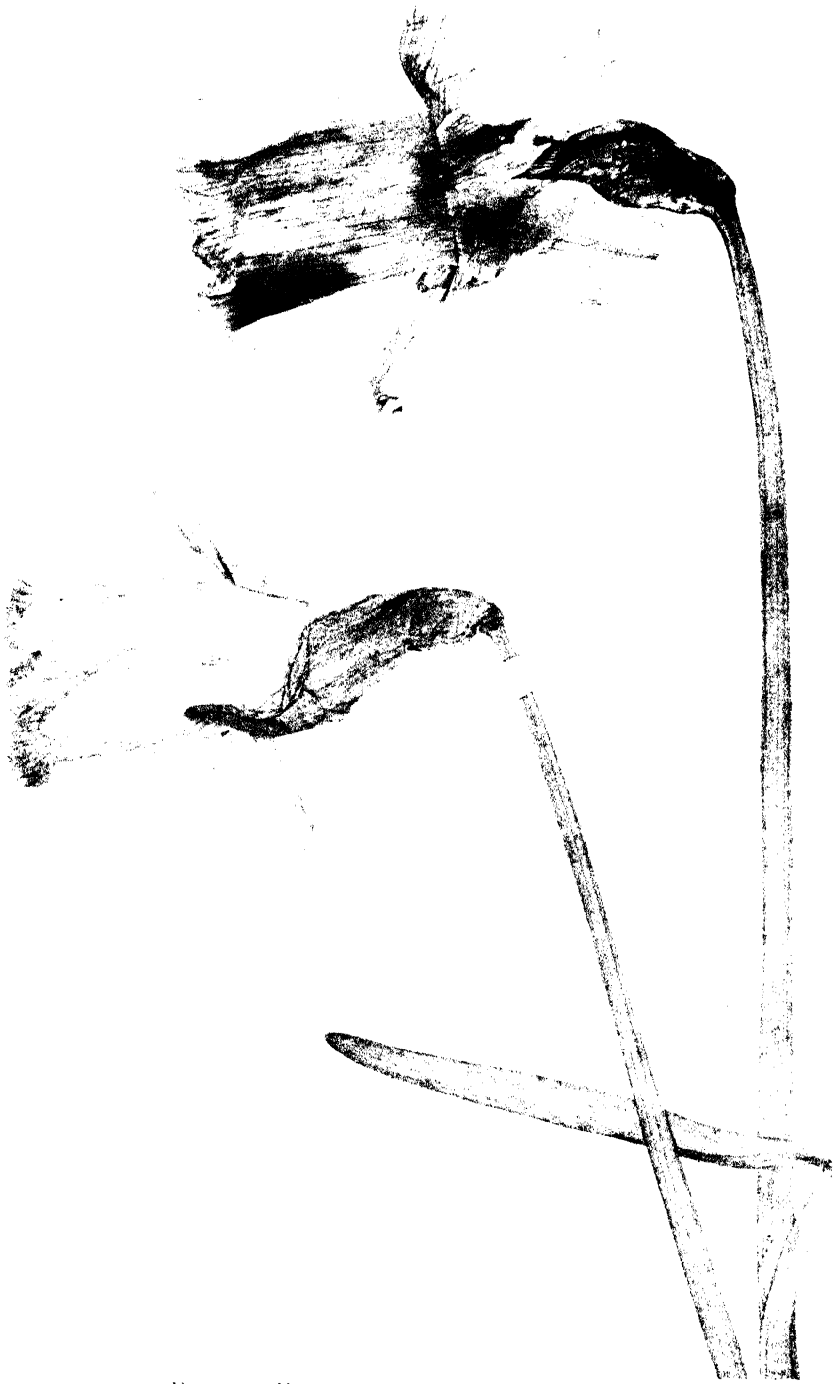


FIG. 14. --*NARCISSUS PALLIDIFLORUS* (nat. size).
From BARR's specimen, 'Bayonne 1880,' in Herb. Kew.

(To face p. 72.)

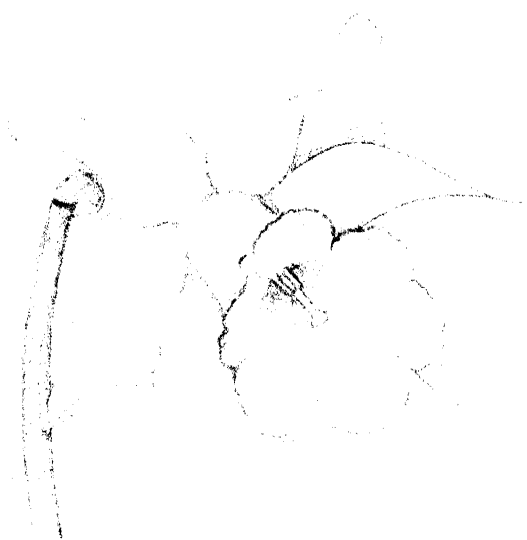


FIG. 15.—NARCISSUS MACROLOBUS (above) ; N. PALLIDIFLORUS
var. INTERMEDIUS (below) (nat. size).
From plants cultivated at Wimbledon 1931, collected in Pyrenees.



FIG. 16. — *NARCISSUS MOSCHATIFOLIUS* (nat. size).
From the specimen in the Linnean Herbarium.

horizontal or ascending, 55-65 mm. long (excluding ovary), with sulphur-yellow perianth, the tube lightly shaded with green, and bright canary-yellow corona deeper towards the margin, strongly scented; perianth-tube relatively short, 15-20 mm. long; perianth-segments narrow, oblong or lanceolate, mucronate or subacute, scarcely imbricated below, erect-spreading, more or less waved and twisted, subequalling the corona; corona long, somewhat dilated and spreading above, the margin cut into six broad, shallow, imbricated lobes, irregularly plicate, waved and obscurely bi-crenate, scarcely rugulose within. Filaments inserted 3-4 mm. above base of perianth-tube; anthers with very minute dark apical spot. Capsule 20-25 mm. long, oval-ellipsoid, obtuse, bluntly trigonous with flattish sides, without furrows. Chromosome number ('princeps') 14 (Philp).

β. *praelongus* var. nov.

Ajax praelongus Jordan, Icones Fl. Europ. iii, 2 (1903).

Icon. Jord. l.c. t. 358.

Leaves rather narrow, twisted. Scape little compressed, furrowed. Pedicel 15-20 mm. long. Flower 50-55 mm. long, with yellow perianth-tube (12-15 mm. long), pale yellow twisted segments, and golden corona with spreading margin cut into six well-marked, crenate lobes. Capsule about 30 mm. long, narrowly oblong-obovoid, obtusely trigonous, much attenuate below. [n.v.]

N. Gayi is clearly allied to *N. Pseudo-Narcissus* and resembles it strongly in the colour and scent of its flowers. But the flowers are not only much larger but differ essentially in their proportions, the perianth-tube being relatively very much shorter. The form of the trigonous capsule is also different, and the points of distinction seem on the whole to warrant the retention of HÉNON's species.

The above description has been adopted from JORDAN's account, collated with the Kew specimen cited and other recent cultivated material. The excellent figure convincingly shows the plant's identity with the modern garden Daffodil known as 'princeps,' the only apparent difference being in the breadth of the leaves, which rarely exceed 10 mm. as grown in Britain. GAY's specimen, cited above, which was a garden plant, was noticed by BURBIDGE, who annotated it "near var. *princeps*."

The plant is not certainly known in a wild state. JORDAN's account was drawn up from a cultivated form of unknown origin, and GAY's specimen came from a botanic garden. BARR [Florist and Pomologist, p. 91 (1884)] attributed an Irish origin to the present-day 'princeps' grown in England, and later [Garden, xxvii. 235 (1885)] he reported that he had obtained it from Italy. Some Pyrenean forms are somewhat similar in the proportions of the flower. A specimen in Herb. Mus. Brit. (GADECEAU, Prairies des bords du Canal Maritime de la Basse Loire, Loire-Inf., 1893, as *N. Pseudo-Narcissus*, fleurs très grandes, très discolores) is a tall plant with very long and attenuate leaves, that has the aspect of *N. Gayi*.

The variety *praelongus* is a French garden plant of doubtful affinities that seems best placed here. It differs from the type in its less compressed scape, its smaller and yellower flowers with more distinctly lobed corona, its longer pedicels and its peculiarly elongate capsules.

The name 'princeps' originated in HERBERT's Amaryllidaceae, where a variety so called is inserted under *Ajax minor* and also under *Ajax tubaeiflorus*. But there seems to be no good reason for associating the present plant with either of these species.

20. NARCISSUS NOBILIS Schultes f. (figs. 5A, 19).

Narcissus nobilis Schultes f. in Syst. Veg. ed. 16, vii, 939 (1830). *Ajax nobilis* Haw. Syn. Pl. Succ. App. 327 (1812); *Narciss. Revis.* 115 (1819); Mon. 3 (1931); *A. Pseudo-Narcissus* var. *nobilis* Herbert, Amaryl. 301 (1837).

Pseudo-Narcissus pyrenaicus hispanico et anglico similis (*P. pyrenaicus variformis*) Park. Par. 99 (1629), ex parte?

Icon. Redouté, Lil. iii, 158, as *N. Pseudo-Narcissus*.

Exsicc. Hort. Soc. Hort. Lond. 1834, in Hb. Lindley; Barr, cult., 1878, in Hb. Kew.; Sennen, Pl. d'Esp., No. 5635, Palencia, as *N. muticus*?; Wilmott, Puerto de Ponton, in Hb. Mus. Brit.

Bulb of moderate size, subrotund, 30–35 mm. long, with brown scales. *Leaves erect*, 15–50 cm. long, *glaucous*, 8–12 (rarely –17) mm. broad, attenuate above, obtuse. *Scape* 15–50 cm. long, erect, rather stout below and tapering upwards, little compressed, 2-edged, strongly striate. *Pedice*l rather slender, *suberect but curved above*, usually *short* (8–15 mm. long). *Flower rather large*, horizontal or ascending, 50–65 mm. long (excluding ovary), *pale yellow*, with deep yellow or greenish perianth-tube and *golden-yellow corona*, strongly scented; *perianth-tube rather long* (20–25 mm.); *perianth-segments elliptic*, elliptic-oblong or elliptic-lanceolate, obtuse-mucronate, imbricated below, more or less spreading, undulate and twisted, subequalling the corona; *corona straight, expanded above* with spreading margin, either *deeply dentate* or *cut irregularly into shallow*, sometimes imbricate lobes, which are more or less crenate-dentate, plicate above, and transversely rugulose within. Filaments inserted 4–5 mm. above base of perianth-tube. Style shortly exceeding stamens. *Capsule* 20–25 mm. long, *broadly ellipsoid, nearly terete*, not furrowed. Chalazal end of seed strongly appendiculate.

Like *N. Gayi* this species is allied to *N. Pseudo-Narcissus*, from which it may be best distinguished by its usually larger size, suberect instead of deflexed pedicels, larger flowers with spreading perianth-segments and corona, and ellipsoid capsules. Its stronger growth, suberect pedicels and ellipsoid capsules similarly separate it from *N. pallidiflorus* and *N. maculobus*; and of these the former is further characterized by its pale flowers, and the latter by its shorter perianth-tube. *N. Gayi* differs in its generally taller growth, shorter perianth-tube with narrower segments, and trigonous capsules.

HAWORTH's *Ajax nobilis* was founded (*l.c.*) on a plant received from a friend, Mr. EVANS, and was briefly described "Scapo teretim ancipiti alte striato, laciniis corollae patentissimis tortis ellipticis luteis, nectario perluteo ore patulo profundissime serrato brevioribus. Precedenti [*A. Telamon*] minor, petalis magis expansis." This short diagnosis is repeated in the *Revisio* and the *Monograph*, with no further details except that in the latter a synonym is cited, "Redouté, Lil. iii. t. 158," the species following *N. Pseudo-Narcissus* and *N. serratus* in a group *Serricoroneae*. *A. nobilis* is reduced by HERBERT, who thought its scent unpleasant, to a variety of *N. Pseudo-Narcissus*, but his account, though more detailed, affords little additional information except to show that the plant was probably of larger growth than the typical species. The figure of REDOUTÉ cited by HAWORTH depicts a large Daffodil of *Pseudo-Narcissus* affinity, but appears more conventional than botanically accurate. There are, fortunately, two flowers in Herb. Lindley, taken from the garden of the London Horticultural Society in 1834, which were named *A. nobilis* by HAWORTH and SABINE. They agree with HAWORTH's description, so far as can be seen, and may apparently be regarded as authentic

specimens. And they are in accord with another contemporary example in Herb. Fielding, which is similarly named. The last specimen shows foliage as well as a flower. The above description has been drawn up from HAWORTH's original account and these early specimens, supplemented by later material that seems conspecific.

In BARR's list in *The Florist and Pomologist*, p. 91 (1884), *N. nobilis* is shown as a form not in cultivation, but subsequently he identified it with *N. variformis* of PARKINSON, which he had reintroduced that year from the Pyrenees. Some of the plants on the mound at Kew are forms of this species. Many of the Daffodils sent out as *variformis*, however, seem to belong to *N. maculobus*.

Like *N. maculobus*, *N. nobilis* grows in the Central Pyrenees, where in 1925 I collected both plants on a single day on the mountains above Luchon. *N. nobilis* also occurs in the Spanish provinces of Leon and Old Castile, and is probably widely distributed. There are other Spanish forms, apparently bearing pale-coloured flowers like *N. pallidiflorus*, that seem to belong to *N. nobilis*. Such is the *exsiccata* "Elias, Izarra, Viscaya" (as *N. sylvestris* Lamk.).

21. NARCISSUS LEONENSIS sp. nov.*

Exsicc. James, Riaño, 1896, in Hb. Lacaita (No. 28950), as *N. bicolor*.

Plant very large and tall. Bulb not seen. *Leaves erect*, long, green, apparently twisted, 12-14 mm. broad, attenuate above, obtuse. *Scape* tall, erect, rather stout, compressed and 2-edged, finely striate. *Spathe* very large, 10 cm. long, tinted with green. *Pedicel* rather stout, *nearly erect*, 20-25 mm. long. *Flower very large*, ascending, 65-70 mm. long to edge of corona, 75-80 mm. to tip of perianth-segments (excluding ovary), *bicoloured* with cream perianth-segments, yellow perianth-tube more or less tinted with green and golden-yellow corona; *perianth-tube* 20-25 mm. long; *perianth-segments ovate-lanceolate*, obtuse-mucronate, imbricated below, apparently erect-spreading, not twisted, *clearly longer than the corona*; *corona much dilated above* (about 40 mm. across), with more or less spreading *margin not lobed* but irregularly and shallowly crenate-lobulate, somewhat plicate, rugulose within. *Style* and *stamens* relatively short. *Filaments* inserted about 7 mm. above base of perianth-tube. *Capsule* (immature only seen) at least 25 mm. long, *oval-ellipsoid*, *apparently not trigonous* or furrowed. [v.s.]

This fine Daffodil is described from a solitary gathering in the north of the Spanish province of Leon. The specimens collected lack complete foliage and scapes as well as bulbs, but fortunately they are extremely well dried so that the characters of the flowers can be satisfactorily determined. The flower is the largest that I have seen in any wild Daffodil. Its colour recalls *N. bicolor* L., as does also the form of the corona, but the insertion of the stamens is widely different, and the pedicel and capsule, so far as can be seen in the flowering stage, rather resemble *N. hispanicus*. A plant so distinct can only be described as

* *Planta maxima, elatior. Folia erecta, viridia, 12-14 mm. lata, sursum attenuata. Scapus robustus, tenuiter striatus. Pedicellus fere erectus, satis longus. Flos maximus, ascendens, ad perianthii apicem 75-80 mm. longus, bicolor perianthii tubo flavo segmentis lacteis coronâque aureâ; perianthii tubus 20-25 mm. longus; segmenta ovato-lanceolata, inferne imbricata, quam corona plane longiora; corona superne valde dilatata, margine patente, haud lobato. Filamenta circa 7 mm. supra perianthii basin inserta. Capsula ovali-ellipsoidea, verisimiliter haud trigona.*

it may possibly be, at least in part, the *N. moschatus* of WILLKOMM and LANGE (*l.c.*), or of MERINO's Flora de Galicia, iii. p. 112 (1909). But, seeing that it was grown as a garden plant early in the seventeenth century, it seems more likely to have been brought from the Pyrenees, where so many forms of the subgenus were first collected. It is a remarkable fact that white Daffodils are described or figured in most of the herbals or botanical works from the beginning of the seventeenth century, and that several of these books mention more than one kind. No fewer than eight are figured by BARRELIER. Among the brief and imperfect descriptions, and often too crude plates, it is not easy always to determine accurately what were the plants intended, but the four pre-Linnean citations shown above seem to refer to the restricted *N. moschatus* represented by the type specimen in the Linnean Herbarium. The plant cited from RUDBECK grew in the garden at Upsala, from which this specimen was obtained.

The synonym *N. candidissimus* has been inserted with some doubt, for the name is based by DE CANDOLLE solely on an early drawing, which is reproduced in REDOUTÉ's plate. DE CANDOLLE's brief diagnosis agrees, so far as it goes, with *N. moschatus*, and was so interpreted by CURTIS, SALISBURY, HAWORTH and HERBERT, but the plate appears to represent a conventional white Daffodil with elegantly twisted perianth. SALISBURY relates (*Trans. Hort. Soc. i. p. 349*) that both *N. moschatus* and *N. tortuosus* were in cultivation in Paris in the time of Henry IV, and that he had seen a fire-screen at Fontainebleau, on which they were depicted with the title "Coquelourdes blancs, 1598." There is a good figure of *N. moschatus* among the drawings by SALISBURY at South Kensington.

In BARR's list of 1884 (*Florist and Pomologist*, p. 91) *moschatus* is starred as a form not then known in cultivation, in contradistinction to *albicans*, *cernuus* and *tortuosus*; and very soon afterwards the name was applied to the recently rediscovered dwarf, white Pyrenean Daffodil, described hereafter as *N. alpestris*. It is doubtful whether the *cernuus* of BARR's list is the *cernuus* of SWEET—a form seemingly more closely allied to *N. tortuosus* than to *N. moschatus*—but it appears to be the plant still sold under the name of *cernuus*, which I am unable to separate from *N. moschatus* L. The specimen in Herb. Lindley from the garden of the Horticultural Society named '*moschatus albus*' by HAWORTH and SABINE in 1834 can still be clearly seen to be the *N. cernuus* of present-day gardens. In his Monograph HAWORTH shows both *N. cernuus* and *N. moschatus* as species, and cites the same synonym from PARKINSON (*P. hispanicus flore albo minor*) for both of them! The very beautiful double-flowered form of this species (*A. cernuus* β *flore elegantissime pleno*, HAW. Mon. p. 2) is still to be seen in cultivation.

A Daffodil that may be mentioned here is that formerly sold under the name of 'Princess Ida,' which I had in the garden about twenty years ago. In flower this somewhat resembled *N. moschatus* but was notable for the pale yellow margin of its whitish corona. I understand

from Mr. P. R. BARR that it was a garden hybrid raised by a grower in Guernsey, but it strongly recalled one of the unidentified plants of the early writers, which is well figured by BARRELIER in Icon No. 924 (*N. sylvestris albicans oris tubae luteis minor*). There is also a *N. albus fimbria lutea* in C. BAUHIN'S Pinax (p. 53), founded on a plant of SWEERT'S, but it is doubtful from the figure whether the same form is intended. I have been unable to trace any specimen of this Daffodil in herbaria, and it appears to be no longer on sale.

23. NARCISSUS ALPESTRIS sp. nov. (figs. 5C, 17).*

N. moschatus Willk. and Lge. Fl. Hisp. i, 152 (1861), ex parte? non Linn.
N. moschatus of Haworth, hort. recent.

Pseudo-Narcissus flore albo Clusius, Alt. Append. Hist. 21 (1605); Gerard ed. 2, 132 (1633)?; J. Bauhin, Hist. ii, 597 (1651); *N. oblonga tuba totus albus* Sweert, Floril. i, pl. 21, f. γ (1612)?; *P. hispanicus flore albo minor* Park. Par. 100 (1629); *N. totus albus nutante fl. longa et angusta tuba* Barrel. Pl. Obs. No. 945 (1714)?

Icones. Clusius, l.c.; Park. l.c. t. 101, f. 4; Gerard, l.c.; J. Bauhin, l.c.; Garden, lxxviii, p. 89, as *N. moschatus* of Haworth.

Exsicc. Maw, Spanish Pyrenees, 1885, in Hb. Mus. Brit., as *N. cernuus* (type); Soc. Dauph. No. 5679, as *N. cernuus*.

Bulb small, ovoid, 20–25 mm. long, with thin, brownish-white scales. *Leaves erect*, 10–15 (rarely 25) cm. long, *glauous, channelled and keeled*, 5–7 (rarely 9) mm. broad, attenuate above, obtuse. Scape 10–15 (rarely 25) cm. long, suberect, slender, little compressed and obscurely 2-edged, distinctly striate. Spathe rather thick and relatively short. *Pedicel slender, arcuate-recurved*, 10–15 mm. long. *Flower rather small, drooping or inverted*, 35–45 mm. long (excluding ovary), *pure white* except the bright green stripes or suffusion on the perianth-tube, almost scentless; *perianth-tube* generally rather narrow, 10–13 mm. long; *perianth-segments* narrowly oblong (more rarely broader, oval), obtuse, scarcely imbricated, *suberect* and drooping over the inverted corona, spirally twisted, clearly *shorter than the corona*; *corona long and narrow* (more rarely shorter and broader), *straight and not apically dilated*, longitudinally plicate, usually with waved but nearly entire and truncate margin, rarely very obscurely and shortly 6-lobed, transversely rugulose within. Filaments inserted about 3 mm. above base of perianth-tube; anthers full yellow. Style long and slender; stigma more clearly 3-lobed than in other species. *Capsule* 12–20 mm. long, *oblong-ellipsoid*, obtuse, *trigonus* or triangular with flattish sides, without furrows. Seed not seen. Chromosome number 14 (Collins).

This species, very distinct by its pure, milky-white, drooping flowers with deep yellow anthers, is most closely related to *N. moschatus*, but differs in its lower and slenderer habit, narrower and more channelled foliage, white flowers with more truncate corona, and broader, more triangular capsules.

N. alpestris is evidently the *Pseudo-Narcissus flore albo* of CLUSIUS, which he received from the Pyrenees with Cyclamens and other plants after the publication of the Rariorum Plantarum Historia in 1601. CLUSIUS regarded it as a remarkable species, and described and figured it in an Altera Appendix ad Historiam (p. 21), which was apparently

* *Folia erecta, glauca, canaliculata et infra carinata, 5–9 mm. lata, attenuato-obtusula. Scapus 10–25 cm. longus, gracilis, parum compressus. Pedicellus gracilis, arcuato-recurvus, longiusculus. Flos satis parvus, cernuus, praeter perianthii tubum viridi-signatum omnino candidus; perianthii tubus saepissime paulo angustus; segmenta anguste oblonga, obtusa, vix imbricata, spiraliter torta, quam corona plane breviora; corona longa, angusta, recta, apice haud dilatata, ore fere integro truncato. Antherae saturate flavae. Capsula oblongo-ellipsoidea, lateribus planiusculis trigona.*

printed with the *Exoticorum Libri Decem* in 1605. The description is in unusual detail and may be translated thus: "In 1604 two bulbs were received from the Pyrenees, sent by JOACHIM VENERIUS, of

PSEUDONARCISSVS albo flore.

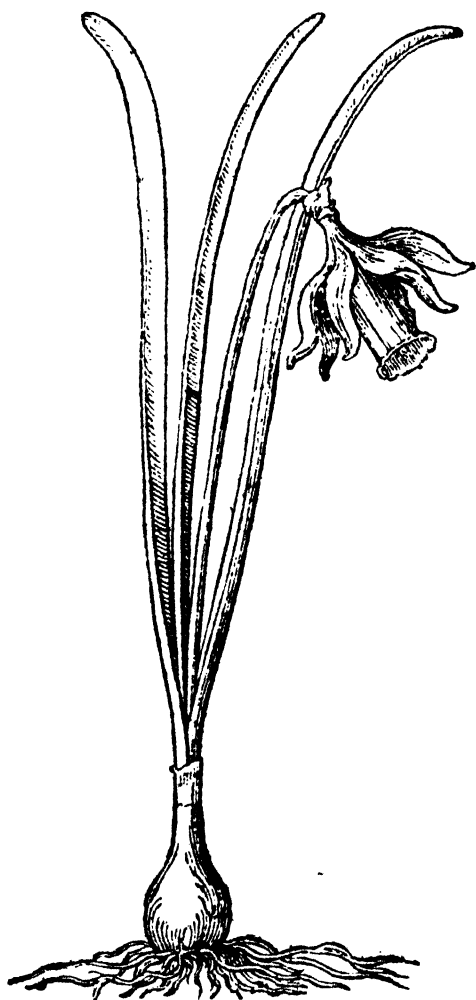


FIG. 17.—*NARCISSUS ALPESTRIS*.
From C. Clusius' *Altera Appendix ad Historiam* (1605).

a form of *Pseudo-Narcissus* not yet described. Its leaves are narrow, a span long, and keeled below; its scape slender, a span long; the flower all white, like that of the common *Pseudo-Narcissus* but a little smaller, an inch and a half long, with six leaves similarly embracing the tube, the tube a little narrower and edge not fimbriate; with six white stamens with yellow anthers and style longer than these. No peculiar scent was noticed and the flower opened in April; the seeds are in a triangular head or case." This account is repeated in JOHN BAUHIN'S *Historia*. The *P. hispanicus flore albo minor* of PARKINSON seems to be the same plant, for the figure, though crude, portrays the form of its flower sufficiently well, and PARKINSON mentions that it is the purest in colour of all the white-flowered kinds. It is also given in JOHNSON'S *Gerard*. It is thus clear that it was brought into cultivation in Britain. It is not easy to determine whether it is one of the white-flowered Daffodils figured by BARRELIER, or

to identify it in the works of other early authors. It seems probable that it was soon lost to cultivation, as might be expected, for it is one of the most difficult species to grow successfully. There is no ground for supposing that LINNAEUS knew it, and it was likewise unknown to CURTIS, SALISBURY, HAWORTH and HERBERT, who were unacquainted with any *Ajax* with uniformly pure white flowers.

It was not till 1885 that it was rediscovered, through GEORGE MAW, as a wild plant in the Central Spanish Pyrenees at an altitude of about 7,000 feet. Its identification with *N. moschatus* has been dealt with under that species. Since the eighties it has been regularly collected in quantity for horticultural purposes from this solitary habitat, and as no other station has been met with, it is to be feared that it is in danger of extinction. It appears to be one of the species that does not increase and rarely maintains itself under cultivation.

24. NARCISSUS TORTUOSUS Haworth (fig. 5D).

- Narcissus tortuosus* Haworth, Dissert. 179 (1803); Willk. and Lge. Fl. Hisp. i, 152 (1861); *N. cernuus* Roth, Catal. Bot. i, 43 (1797)? non Salisb.; *N. moschatus* a Ker in Bot. Mag. No. 924 (1806); *Ajax longiflorus* Salisb. in Trans. Hort. Soc. i, 349 (1812); *A. moschatus* Haw. Narcess. Revis. 118 (1819); *A. tortuosus* Haw. in Phil. Mag. 131 (1830); Mon. 2 (1831); *A. cernuus* Sweet, Brit. Fl. Gard. Ser. II, ii, No. 101 (1833)?; *A. moschatus* var. *tortuosus* (and var. *cernuus*?) Herbert, Amaryll. 304 and 415-6 (1837); *N. tortuosus* hort. recent.
- Pseudo-Narcissus hispanicus flore albo major* Park. Par. 100 (1629); *N. sylvestris totus albus amplo calice* Theatr. Fl. Pl. 20 (1633)?; *N. flore exalbido calice praelongo fimbriato* Rudbeck, Camp. Elys. 82, f. 18 (1701); *N. totus albus amplo nutante flore* Barrel. Pl. Obs. No. 954 (1714).
- Icones.* Barrel. l.c. No. 954; Bot. Mag. t. 924, as *N. moschatus* a.
- Exsicc.* T. Moore, cult., 1852, in Hb. Kew., as *N. cernuus*; Forbes Young, Cobham Lodge, 1857, in Hb. Kew., as *N. moschatus*; J. B. Syme, cult., 1864, in Hb. Manchester; Munby, cult., 1870 and 1872, in Hb. Kew., as *N. moschatus* a Curt.; Gadeceau, cult., 1905, in Hb. Mus. Brit.; Pugsley, No. 482; Sennen, Pl. d'Esp., No. 5634, Santander, 1925, as *N. major*.

Bulb of moderate size, ovoid, 30-40 mm. long, with pale whitish-brown scales. Leaves erect, 25-35 cm. long, glaucous, slightly channelled, not twisted, 7-10 mm. broad, attenuate above, obtuse. Scape 25-40 cm. long, erect, rather slender, compressed and 2-edged, finely striate. Pedicel curved, short (10-15 mm. long). Flower rather large, slightly drooping, 45-60 mm. long (excluding ovary), sulphur-white with perianth-tube shaded with yellow passing to green below and very pale sulphur corona, the whole fading to white, distinctly ginger-scented: perianth-tube 12-20 mm. long; perianth-segments oval-lanceolate or oval, obtuse-mucronate, slightly imbricated below, incurved-spreading, much spirally twisted and more or less laterally reflexed, shorter than the corona; corona large and somewhat apically expanded, longitudinally plicate, with subspreading margin cut into six shallow, rounded, subentire or more or less crenate lobes, transversely rugulose within. Filaments inserted 3-4 mm. above base of perianth-tube; anthers straw-coloured, with minute, dark apical spot. Stigma small, less lobed than in *N. moschatus*. Capsule 20-25 mm. long, oblong-ellipsoid, rounded-obtuse, bluntly trigonous with shallow furrows. Chalazal end of seed strongly appendiculate.

N. tortuosus, notable for its pale and beautifully symmetrical flower, is separable from *N. moschatus* by its stronger growth and broader foliage, and by its larger and less concolorous flowers, with regularly twisted and morespreading perianth-segments shorter than the corona. Of *N. cernuus* Roth no authentic material has been seen, but the plant represented in SWEET's figure (l.c.) seems indistinguishable from *N. tortuosus*, unless perhaps for its narrower corona. There is an excellent drawing of a flower of *N. tortuosus* in the Salisbury Collection at South Kensington.

Like *N. moschatus*, this species has not been certainly known as a wild plant. HAWORTH originally gave "Hispania" as its habitat,

but no definite locality seems to have been recorded. There is now, however, in Herb. Mus. Brit., a gathering "Sennen, Plantes d'Espagne, No. 5634," collected near Santander by LEROY in 1925, which appears to be typical *N. tortuosus*, differing from most cultivated examples only by its rather smaller flowers and narrower leaves. It was named '*N. major* Curtis' by GANDOGER, but SENNEN notes its affinity with *N. moschatus*. The rediscovery of this species as a wild plant is of considerable interest.

There is little doubt but that *N. tortuosus* was cultivated at a very early date. The existence of a picture of its flower on a French fire-screen dated 1598 has already been mentioned in the account of *N. moschatus*. There is an interesting allusion to a Daffodil of this kind in the *Curae Posteriores* of CLUSIUS (p. 14), printed in 1611 after the author's death, which runs as follows: "*Pseudo-Narcissus flore albo varietas*—I have observed two differences in this plant; one with taller stem and more oblong flower with narrow tube; the other with lower stem, shorter leaves and laxer tube. Each has unequal and slightly fimbriate margins; no difference in leaves and bulb. But of the taller plant with narrower tube a plant was brought to me which bore a flower white indeed but tending to ochroleucous. PORRETUS similarly had a plant which bore a flower not nodding and pendulous like others of this kind, but standing out like the common *Pseudo-Narcissus*. The bitter winter of 1607 killed all the bulbs but a few."

In Britain *N. tortuosus* appears to have been in cultivation ever since the time of PARKINSON. It was well known to the botanists and gardeners of the first half of the last century, when according to SALISBURY it was commoner than *N. moschatus*. It is excellently figured in the *Botanical Magazine* (*l.c.*). The form identified by BARR with *N. tortuosus*, as shown in the *Gadeceau exsiccata* in Herb. Mus. Brit., appears to differ from the original plant of HAWORTH in having a rather more drooping flower with a broader corona. It seems to be the *N. tortuosus latifolius* of HARTLAND'S *Little Booke of Daffodils*, where there is a figure of the flower, but its origin is unknown. In many gardens *N. tortuosus* is an uncertain grower, and within the last two decades both it and *N. albescens* have been generally discarded by horticulturists in favour of modern hybrids. There are still a few plants of *N. tortuosus* on the mound at Kew, and it has not been entirely abolished by the Dutch growers.

25. NARCISSUS ALBESCENS nom. nov.

- Ajax albicans* Haw. Mon. 2 (1831); Sweet, Brit. Fl. Gard. Ser. II, ii, No. 145 (1833); Jordan, Icones Fl. Europ. iii, 1 (1903); *A. moschatus* var. *albicans* Herbert, Amaryll. 304 and 416 (1837); *N. albicans* hort. recent.
- Pseudo-Narcissus totus albus* Hort. Eystt. 2nd Ord. f. 2 (1613)?; *Narcissus albus oblongo calice* C. Bauh. Pin. 53 (1623)?; *P. maximus albidus* Park. Par. 100 (1629)?; *N. montanus sylvestris totus albus major* Merian, Floril. Ren. t. 135 (1641)?
- Icones.* Sweet, *l.c.* t. 145; Jordan, *l.c.* t. 356.
- Exsicc.* Hort. H.S., 1824, in Hb. Fielding, as *N. moschatus* (Dutch); T. Moore, cult., 1852, in Hb. Kew., as *N. albicans*; Gadeceau, cult., 1905, in Hb. Mus. Brit., as *N. albicans*.

Bulb rather large, ovoid, 35–50 mm. long, with pale brownish scales. *Leaves erect*, 35–40 cm. long, *glaucescent*, *nearly flat*, 10–12 mm. broad, obtuse. Scape 35–40 cm. long, erect, moderately stout, much compressed and 2-edged, striate. *Pedicel* rather slender, *curved*, 20–25 mm. long. *Flower* rather large, *nearly horizontal* or slightly drooping, 50–60 mm. long (excluding ovary), sulphur-white with perianth-tube shaded with yellowish-green and pale sulphur-yellow corona, the whole becoming whitish with age, faintly scented; *perianth-tube* rather narrow, 16–20 mm. long; *perianth-segments* lanceolate-elliptic or oblong, acute or mucronate, slightly imbricated, *erect-spreading*, undulate and twisted, rather shorter than the corona; *corona* long, straight and somewhat apically dilated, longitudinally plicate, with spreading, 6-lobed margin, the lobes rounded and crenate but little crisped or plicate. Filaments inserted 4 mm. above base of perianth-tube. Style rather short; stigma 3-lobed. *Capsule* 20–25 mm. long, *narrowly ellipsoid*, attenuate at both ends, *sublerete*.

N. albescens is related to *N. moschatus* and *N. tortuosus*, as may be seen from its pale-coloured flowers and ellipsoid fruit. It is a much larger plant than *N. moschatus*, with broader foliage, and larger, less pendulous and somewhat bicoloured flowers, with more spreading and less twisted perianth-segments, and a more expanded and lobed corona. *N. tortuosus* differs chiefly in its shorter pedicel, symmetrically twisted perianth-segments, and more obovate capsule.

N. albescens is not known as a wild plant. It may possibly be the *N. moschatus* reported in WILLKOMM and LANGE'S *Flora Hispanica*, i. p. 152, for Galicia, but a more likely habitat is the Pyrenees, for some of the Daffodils of that region distributed by BARR as *N. variformis* appear somewhat intermediate between *N. albescens* and *N. Pseudo-Narcissus*. The plant was evidently cultivated in Holland at the beginning of the nineteenth century, as shown by the example at Oxford cited above. Whether it was known to CURTIS and SALISBURY is uncertain—they may have confused it with *N. tortuosus*. And it was only distinguished by HAWORTH in 1831 in the Monograph, where the account is taken from plants he had noticed growing at Epsom in that year. HAWORTH'S diagnosis runs: "Corollae laciniis ovato-lanceolatis planiusculis albidis; corona crenata sulphurascente," and he gives as a synonym the above-cited plant of PARKINSON. HERBERT (*l.c.*) treated this plant as a variety *albicans* of *A. moschatus*, but in his "Postscript" it is raised to specific rank. It is included under the name *albicans* in the *N. moschatus* group in BARR'S list of 1884. In 1903 it was fully described and beautifully illustrated in the posthumous third volume of ALEXIS JORDAN'S *Icones ad Floram Europae (l.c.)*. JORDAN knew it only as a cultivated plant. Prior to the Great War it was commonly included in nurserymen's catalogues, the bulbs sold being chiefly grown in Holland, but it now appears to be superseded by the modern garden hybrid 'Madame de Graaf.'

This species has hitherto been known as *A. albicans* or *N. albicans*, but the specific epithet is invalid owing to the existence of an earlier *N. albicans* Sprengel, *Syst. Veg.* ii. 45 (1825), which is a *Corbularia*. As no other valid name has been found, it has become necessary to rename the present species.

Series VI. *Bicolores*.*

Flowers of moderate size or rather large, bicoloured or yellow, with short perianth-tube and nearly erect flowering pedicel. Capsule obovoid, trigonous or not. Chalazal end of seed not appendiculate.

26. *NARCISSUS BICOLOR* Linn. (figs. 5E, 18).

Narcissus bicolor Linn. Sp. Pl. ed. 2, 415, excl. syn. partim (1762), et ejusdem herb.; Gouan, Illustr. Bot. 22 (1773); Haworth in Trans. Linn. Soc. v, 244 (1800); Ker in Bot. Mag. No. 1187 (1809); *N. tubaeflorus* Salisb. Prodr. Stirp. 221 (1796); *Ajax lorifolius* and *A. bicolor* Salisb. in Trans. Hort. Soc. i, 346 (1812); *A. bicolor* Haw. Narciss. Revis. 119 (1819); Phil. Mag. 132 (1830); Mon. 2 (1831); Herbert, Amaryll. 302 (1837); *N. Pseudo-Narcissus* var. *bicolor* Willk. and Lge. Fl. Hisp. i, 151 (1861); *N. Pseudo-Narcissus* subsp. *N. bicolor* Baker, Amaryll. 4 (1888); *N. Pseudo-Narcissus* subsp. *N. silvestris* race *N. bicolor* Rouy, Fl. Fr. xiii, 30 (1912).

Pseudo-Narcissus albus calice luteo Hort. Eystt. 2nd Ord. f. 2 (1613); *N. albus calice flavo moscari odore* C. Bauh. Pin. 52 (1623); Rudbeck, Camp. Elys. 69, f. 6 (1701); *Bulbocodium flore pallido, tubo flavo, serotinum* Ray, Hist. 1130 (1688).

Icones. Bot. Mag. t. 1187; Burbidge, Narcissus, pl. vi.

Exsicc. Hort. Soc. Hort. Lond., 1824, in Hb. Fielding; Pulteney, Gillingham, Norfolk, in Hb. Mus. Brit.; T. Moore, Chelsea, 1852, in Hb. Kew.; Forbes Young, Cobham Lodge, 1853, in Hb. Kew.; J. B. Syme, cult., 1864, in Hb. Manchester; Barr, cult., 1873, in Hb. Kew.; Gadeceau, cult., 1903 and 1905, in Hb. Mus. Brit.

Bulb large, ovoid, 50–60 mm. long, with brown scales. *Leaves erect*, 30–40 cm. long, green or glaucous, nearly flat and not twisted, 12–20 mm. broad, obtuse and not attenuate. Scape 30–40 cm. long, erect, rather stout, moderately compressed, 2-edged, finely striate. *Pedicel* rather slender, nearly erect but slightly curved above, 15–25 mm. long. *Flower rather large*, ascending or horizontal, 40–45 mm. long (excluding ovary), bicoloured, whitish or cream-coloured, with yellow, green-shaded perianth-tube and golden-yellow corona, almost scentless; *perianth-tube short and broad* (about 10 mm. long), slightly hexagonal; *perianth-segments cordate-ovate* or broadly ovate-elongate, acute or cuspidate, rounded and much imbricated below, spreading and somewhat hooded, slightly undulate but not twisted, rather shorter than the corona; *corona large*, very slightly ventricose below and somewhat dilated above (25–30 mm. across), more or less longitudinally plicate, with more or less spreading margin, which is obscurely 6-lobed, the lobes shortly rounded-obtuse or subtruncate, with coarse but shallow crenatures. Stamens and style relatively long; filaments inserted close to base of perianth-tube (1–2 mm. above); anthers without dark apical spot. *Capsule* 15–20 mm. long, subrotund-obovoid obtuse to sub-truncate, scarcely trigonous, 6-furrowed. Chalazal end of seed apparently not appendiculate.

β. *lorifolius* (Herb.) comb. nov. (fig. 19).

Ajax lorifolius Haw. Narciss. Revis. 119 (1819), excl. syn.; Mon. 2 (1831), excl. syn.; *A. bicolor* var. *lorifolius* Herbert, Amaryll. 302 (1837); *N. lorifolius* Schultes f. Syst. Veg. ed. 16, vii, 944 (1830), non Rouy, Illustr. Pl. Europ. Rar. i, 7 (1895), nec *N. Pseudo-Narcissus* var. *lorifolius* Gillot in Bull. Soc. Bot. Fr. xxx, 15 (1883); *N. rugilobus* hort. recent., non *A. rugilobus* Haw. Mon. 3 (1831).

Exsicc. Hort. Soc. Lond. Hort., 1834, in Hb. Lindley; Gadeceau, cult., in Hb. Mus. Brit., as *N. rugilobus*.

Leaves longer and narrower than in the type, 8–13 mm. broad. Scape stout. *Pedicel* only 10–12 mm. long. *Flower* 40–50 mm. long, pale yellow, with deeper-coloured tube, and full yellow corona; *perianth-segments* ovate-elliptic,

* Flores mediocres vel majusculi, bicolores vel lutei, perianthii tubo brevi et pedicello florifero fere erecto. Capsula obovoidea, nonnunquam trigona. Seminibus apex chalazae versus haud appendiculatus.

subobtuse-mucronate or acute, ascending, much imbricated, subequalling the broad corona; margin of corona obscurely and obtusely lobed, more or less plicate and undulate. Capsule broadly subglobose. Chalazal end of seed not appendiculate (at least in f. 'Emperor'). Otherwise as in the type.

N. bicolor is a very distinct plant that cannot well be confused in its typical form with any of its allies. Its bulb is relatively large, and its habit more robust than in any other species of the subgenus, excepting perhaps *N. leonensis*. Its broad, flat leaves are characteristic, so are also its markedly bicoloured flowers, with broad, imbricated, spreading perianth-segments springing from a very short tube, and a large but slightly lobed corona cut only into shallow, rounded-obtuse segments. But the most important feature is seen in the stamens, which are free almost to the base of the perianth-tube, as was pointed out in the Botanical Magazine (*l.c.*). It has not been possible to examine seeds of the typical species, but those of its hybrids 'Emperor' and 'P. R. Barr' are without the chalazal appendage, and if, as is probable, this peculiarity is general in *N. bicolor*, it is clearly an indication of affinity with *N. abscissus*. It has apparently not been practicable to determine the cytology of the typical form, but its hybrids 'Empress,' 'Horsfieldii,' and 'Victoria' show 21, 22 and 22 chromosomes respectively.

The species does not appear to have been brought into general cultivation so early as most of the other Ajax forms. It is not mentioned by CLUSIUS, GERARD or PARKINSON, but it seems to be the *Pseudo-Narcissus albus calice luteo* of the Hortus Eystettensis, which is the *Narcissus albus calice flavo moscari odore* of C. BAUHIN's Pinax. The figure in Hort. Eystt. is crude, but it depicts a plant with broad leaves, a spreading perianth, and a corona with a shortly lobed and spreading margin. Its flower is evidently bicoloured. The plant is thus much nearer in appearance to *N. bicolor* than to any form of *N. moschatatus*, under which LINNÆUS placed BAUHIN's name as a synonym. What is exactly intended by the term "moscari odore" may be uncertain, but most, if not all, of the forms of *N. bicolor* are but slightly scented and lack the strong 'daffodil' odour of *N. Pseudo-Narcissus*. BESLER's figure, with BAUHIN's name, is reproduced by RUDBECK (*l.c.*), who perhaps knew the plant at Upsala, where *N. bicolor* was grown, for the specimen in the Linnean Herbarium bearing this name is from the Upsala garden. This specimen, which is in good condition, consists of a flower and leaf, and was placed in the herbarium before 1767. It agrees well with LINNÆUS' brief description "Similis *N. Pseudo-Narcisso* sed petala alba, nectarium saturate luteum, majus; limbo patulo, undulato, crenato," and must be regarded as the type of the Linnean species. LINNÆUS cites two synonyms only for *N. bicolor*, both from the Pinax. The first of these represents a bicoloured Daffodil that cannot be exactly determined but is not at variance with the description; the second synonym belongs to the great yellow Spanish Daffodil and was cited in error by LINNÆUS, as pointed out under *N. hispanicus*.

Meanwhile, *N. bicolor* had been brought to the notice of RAY, who describes it in his *Historia* (*l.c.*) as *Bulbocodium flore pallido, tubo flavo, serotinum*. RAY received the plant from UVEDALE, and there is a specimen of it in the Sloane Herbarium at the Natural History Museum (H.S. 312, f. 56), furnished by UVEDALE, which matches the Linnean specimen and establishes its identity. In 1773 a somewhat fuller description of *N. bicolor* was furnished by GOUAN (*l.c.*), and in 1796 SALISBURY (*l.c.*) described as *N. tubaeiflorus* a plant which he identified with RAY's *Bulbocodium* . . . *serotinum* but did not recognize as *N. bicolor* L. This he said had been obtained by UVEDALE, through MAGNOL, from Montpellier, in France. KER-GAWLER described and figured the plant satisfactorily in 1809 in *Bot. Mag.* No. 1187 under its Linnean name, pointing out its differences from *N. major* and *N. Pseudo-Narcissus*; and three years later SALISBURY (*l.c.*) sunk his name *N. tubaeiflorus* under *A. bicolor* (*N. bicolor* L.). There are characteristic drawings of *N. bicolor* by SALISBURY in the collection at South Kensington. At the same time SALISBURY (without explanation or any description) separated *N. bicolor* of *Bot. Mag.* No. 1187 from the Linnean species and renamed it *A. lorifolius*, which he said grew in gardens round London, especially at Lewisham. I am quite at a loss to understand why SALISBURY dealt thus with *N. bicolor* of the *Bot. Mag.*, the figure and description of which seem to agree well with the Linnean specimen and the characters assigned to the species by RAY and by LINNAEUS. The name *A. lorifolius* was subsequently taken up by HAWORTH (*l.c.*) to represent a plant with longer, narrower leaves and yellower perianth-segments than those of *N. bicolor* L., but it was never fully described nor based on any valid synonym other than the *Bot. Mag.* No. 1187. HERBERT shows *lorifolius* as a variety of *A. bicolor*, but furnishes no useful information; and BAKER (*Amarylloideae*, p. 4) treats it as a form between *N. major* and *N. bicolor*. There is a specimen in *Herb. Kew.*, labelled in BAKER's handwriting "*N. lorifolius* Haw. Oxford Garden, 1887," with very broad leaves and a large, broad flower, which appears to be the garden hybrid 'Emperor.'

Before 1884 BARR had obtained a Daffodil which he considered identical with HAWORTH's *A. lorifolius*, and a second one which he thought was *A. rugilobus*, another species established by HAWORTH in his *Monograph*, where it is placed between *A. lobularis* and *A. cambricus*, with a very inadequate description and no synonymy. These two plants, *A. lorifolius* and *A. rugilobus*, were placed together in BARR's list of 1884 to form a group *lorifolius*; and WOLLEY-DOD remarks (*Gard. Chron.* xxi. 642) that he could find no difference between them. The plant identified as *N. lorifolius* was not long retained by BARR, for it had disappeared from his annual catalogue before 1900, but *N. rugilobus* continued on sale till 1917, and formerly grew in my garden. It resembles a small 'Emperor,' as stated by BARR, who at one time described it as a native of Lincolnshire, where it had probably become naturalized. Its affinities lie with *N. lorifolius*,

as understood by British botanists, and it agrees sufficiently with HAWORTH's brief account of this species. Its identification by BARR with *A. rugilobus* Haw. is evidently incorrect, for this is a deep yellow Daffodil, with longer perianth-tube and deeply lobed, spreading corona, connected with the group *Lutei*. GADECEAU, who cultivated BARR's plant, comments on this discrepancy. It therefore seems best to treat BARR's *rugilobus* as identical with *A. lorifolius* Haw., and to regard HAWORTH's species as a variety of *N. bicolor* L., the differences being insufficient for specific distinction. This variety is no longer easy to obtain in horticulture, but the well-known garden form 'Emperor' has somewhat similar features, albeit larger in all its parts.

In 1883 the name *lorifolius* (as a variety of *N. Pseudo-Narcissus*) was adopted by GILLOT (Bull. Soc. Bot. Fr. xxx. p. xv) for a wild Daffodil collected in the Basses-Pyrénées, and he noted that its identity with *N. lorifolius* of British authors had been confirmed by VILMORIN. This plant was later described as *N. lorifolius* R. and S. by ROUY [Illust. Pl. Europ. Rar. i. 7 (1895)] and illustrated by photographed *exsiccata*. In the Flore de France it appears, under the name of race *N. lorifolius* of subsp. *N. moschatius*, as a widely spread Pyrenean Daffodil, while *N. muticus* Gay stands as a separate race of the same subspecies. The points of distinction between the two races seem somewhat slight, and GAY's specimens at Kew agree less with the race *N. muticus*, as defined by ROUY, than with the race *N. lorifolius*, as depicted in ROUY's earlier plate. The Pyrenean plant, from which it has been suggested that *N. bicolor* has been derived, is not identical with the British *N. lorifolius*, and still less with typical *N. bicolor*, and will be further dealt with under *N. abscissus*.

In his Revisio, under *A. lorifolius*, HAWORTH shows two varieties, β *brevisflos* and γ *anceps*, which he saw in London, each on one occasion only, in 1809 and 1811 respectively. The former of these is raised to specific rank in the Monograph without any further detailed information. BARR succeeded in obtaining what he considered were these two plants, for they are included in his list of 1884, where *brevisflos* is identified with *N. bicolor* of the Bot. Mag., but they are not shown in his sale catalogues from 1900 onwards. BAKER (*l.c.*) mentions *brevisflos* under *N. bicolor*. I have been unable to trace any material of *A. brevisflos*, but there are specimens of 'bicolor *anceps*' from Hort. Soc. Garden Lond., 1834, in Herb. Kew. and Herb. Lindley. These show foliage 10 mm. broad and flowers resembling a small *N. bicolor* with a rather short pedicel. In his "Observationes" in Phil. Mag. ser. III, v. 1, 276 (1832) HAWORTH treats *A. anceps* as a species, which he says may be distinguished from *A. bicolor* by its narrower, non-glaucous foliage.

The typical form of *N. bicolor* seems to have been almost lost to cultivation in Britain during the present century, although still grown at Kew. It is most closely represented by the garden form 'Grandis,' and the well-known 'Empress' and 'Horsfieldii' are hybrids in which it is the predominant parent. LINNÆUS gives "In Europâ australi"

as the habitat of *N. bicolor*, and GOUAN locates it in the Pyrenees, but no exact native station for the typical species or for var. *lorifolius* is now known. The bulbs received by UVEDALE from Montpellier were probably not wild. In WILLKOMM and LANGE's *Flora Hispanica* (l.c.) Galicia and the Western Pyrenees are cited, and BARR found what he regarded as *N. bicolor* in some quantity at Braga, in Portugal. There is a specimen in Herb. Kew., collected by SCHLOSSER in meadows at Kreutz and Slanje, in Croatia (as *N. Pseudo-Narcissus*), that seems to belong to var. *lorifolius*. It was presumably a naturalized plant, as indicated in the *Flora of Croatia*.

N. bicolor is a late-flowering species, but the variety *lorifolius* usually blooms in English gardens before the end of March, about a month earlier than the typical form.

27. NARCISSUS ABSCISSUS Schultes f.

Narcissus abscissus Schultes f. *Syst. Veg.* ed. 16, vii, 941 (1830), excl. syn. partim; *Ajax abscissus* Haw. *Narciss. Revis.* 116 (1819); Herbert, *Amaryll.* 305 (1837); *Oileus abscissus* Haw. *Mon.* 4 (1831); *A. muticus* Gay in *Bull. Soc. Bot. Fr.* vii, 308 (1860) and ix, 279 (1862); *N. Pseudo-Narcissus* var. *lorifolius* Gillot in *Bull. Soc. Bot. Fr.* xxx, p. xv (1883); *N. Pseudo-Narcissus* subsp. *N. muticus* Baker, *Amaryll.* 3 (1888); *N. lorifolius* Rouy, *Illustr. Pl. Europ. Rar.* i, 7 (1895), non Schultes f.; *N. Pseudo-Narcissus* subsp. *N. moschatus* race *N. lorifolius* Rouy, *Fl. Fr.* xiii, 32 (1912).

N. oblonga tuba rotunda quasi abscissa flavo flore Sweert, *Floril.* i, pl. 21, f. 4 (1612)?; *N. flavus tubo rotundo* C. Bauh. *Pin.* 52 (1623)?; *Pseudo-Narcissus angustifolius flore flavescens tubo quasi abscisso* Park. *Par.* 104 (1629); *N. hispanicus luteus amplo calice flore natante* Theatr. *Fl.* pl. 20 (1633)?; *N. totus luteus oblongo calice et foliis pendentibus* Merian, *Floril. Ren.* t. 135 (1641)?; *N. flavus tubo rotundo majore* Rudbeck, *Camp. Elys.* 69, f. 4 (1701)?

Icones. Park. *l.c.* t. 107, f. 1; Rouy, *l.c.* t. 22, as *N. lorifolius*; *Flor. Mag.*, N. Ser. 1876, t. 224, as *N. muticus* (f. perianthio patente); *Gard. Chron.*, N.S. xxi, f. 121 (1884), as *N. bicolor*.

Exsicc. Gay, H. P., 1862, in *Hb. Kew.*, as *A. muticus*; Gay, Carrés Chaptal, 1858, 1859 and 1863, in *Hb. Kew.*, as *A. muticus*; Boutigny, Lourdes, 1854, in *Hb. Kew.*, as *N. muticus*; Bordère, Gavarnie, 1869, in *Hb. Kew.*, as *N. muticus*; Bordère, Gèdres, 1887, in *Hb. Mus. Brit.*, as *N. muticus*.

Bulb of moderate size, ovoid, 25–35 mm. long, with brown scales. *Leaves erect* or recurved above, 30–35 cm. long, green or slightly glaucous, nearly flat, 10–12 mm. broad, obtuse. Scape 30–40 cm. long, erect, rather slender, moderately compressed and acutely 2-edged, finely striate. *Pedicel* rather slender, erect but curved above, 15–35 mm. long. *Flower* rather large, nearly horizontal, 45–50 mm. long (excluding ovary), pale or sulphur-yellow with orange-yellow tube sometimes shaded with green and deep golden-yellow corona; *perianth-tube* very short (8–12 mm.), obconic; *perianth-segments* ovate-lanceolate or lanceolate, obtuse-mucronate, acute or acuminate, generally rounded and imbricated below, undulate, subequal to and ascending over the corona or more rarely more or less spreading; *corona* cylindrical, straight, often relatively narrow, rarely dilated above (15–20 mm. across), somewhat longitudinally plicate, with margin suberect, obscurely 6-lobed with slightly crenate lobes, or with irregular, shallow crenatures, rarely with numerous small, blunt teeth. Filaments inserted 2–4 mm. above base of perianth tube; anthers without dark apical spot. Style rather long. *Capsule* 20–25 mm. long, broadly ellipsoid or obovoid, rounded-obtuse, trigonous and scarcely furrowed; sometimes in dwarf plants almost subglobose. Chalazal end of seed obtuse, not appendiculate. Chromosome number 14 (De Mol, ex Philp).

β. *serotinus* var. nov.

Ajax serotinus Jordan, *Icones Fl. Europ.* iii, 3 (1903).
Icon. Jordan, *l.c.* t. 363.

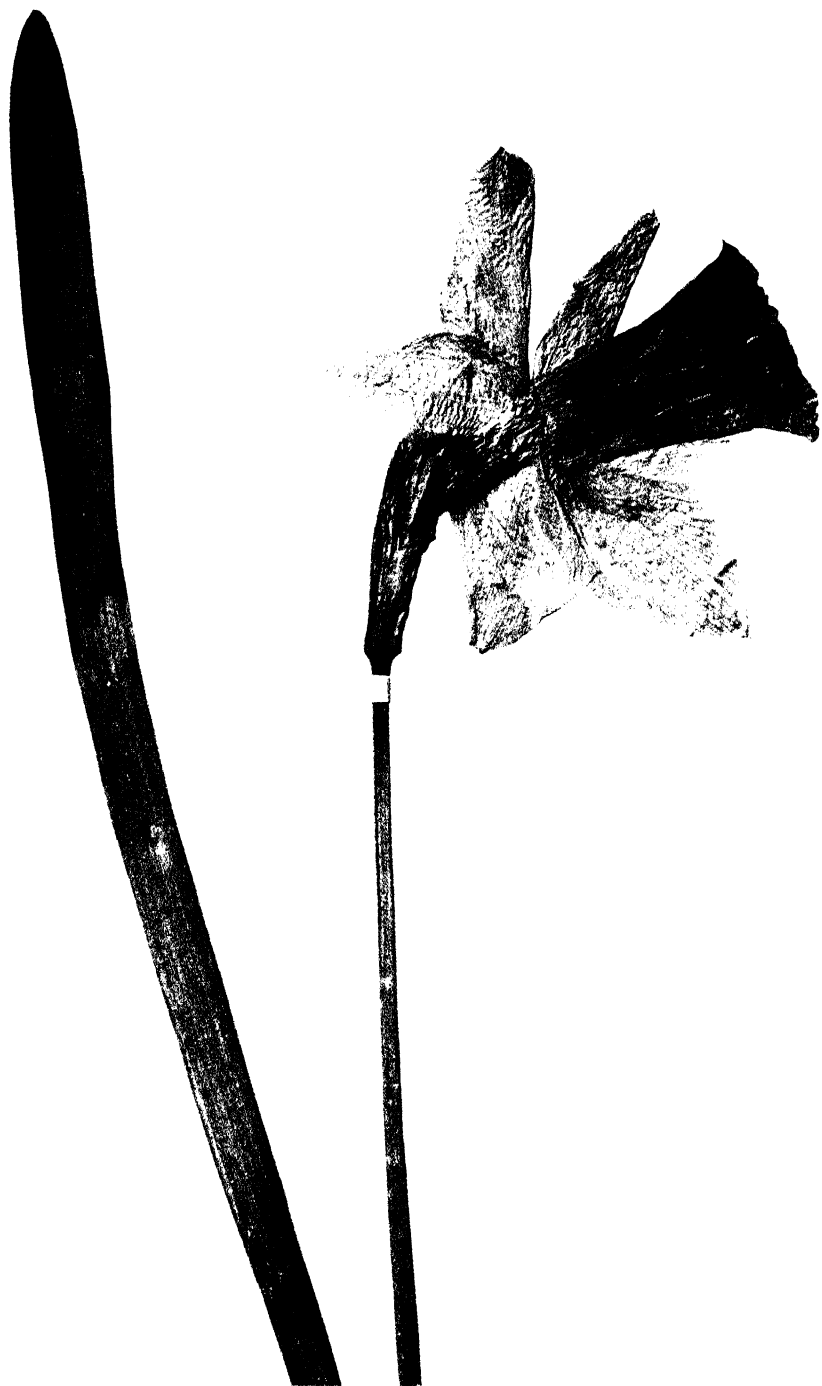


FIG. 18. —NARCISSUS BICOLOR (nat. size).
From the specimen in the Linnean Herbarium.

[To face p. 88.

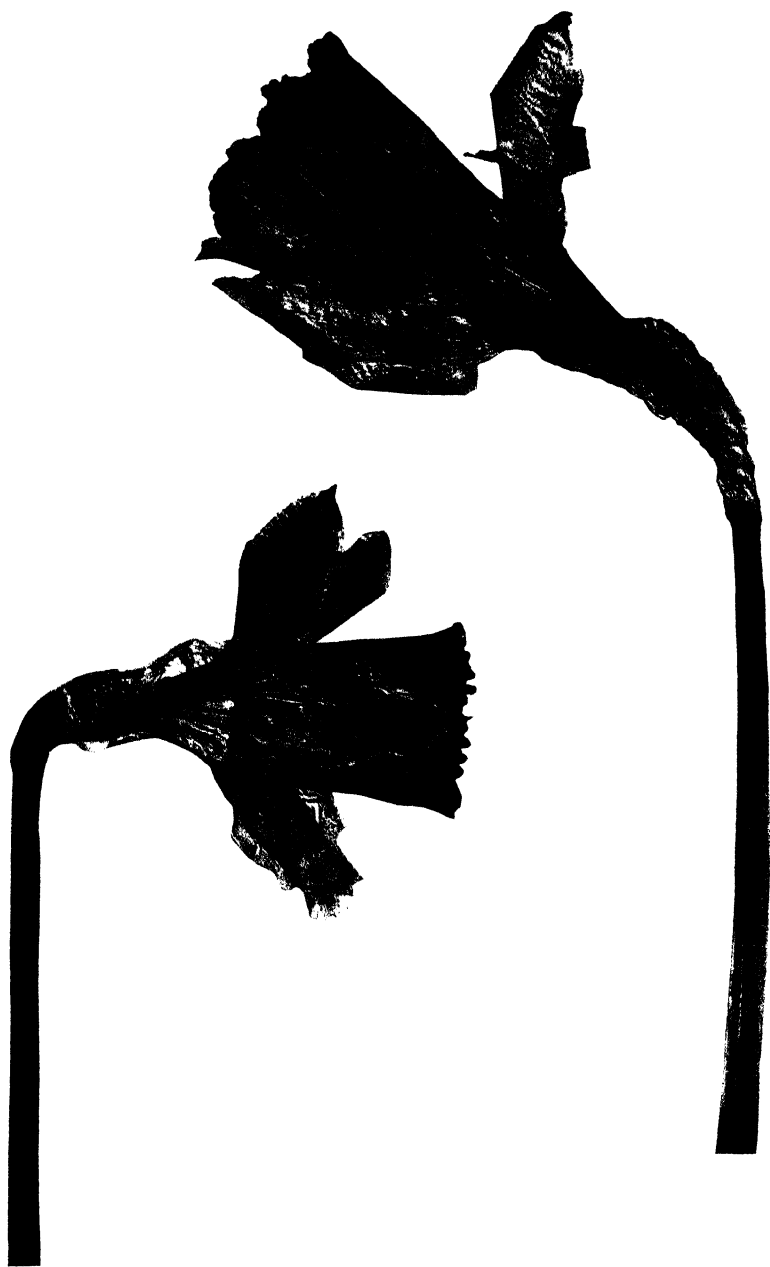


FIG. 19. --NARCISSUS NOBILIS (above) ; N. LORIFOLIUS (below) (nat. size).
From specimens in Herb. Lindley at Cambridge.

Scape much shorter than the leaves, 20–25 cm. long. Perianth-segments subrhomboid-ovate, waved, spreading; *corona* narrow, with slightly expanded, lobate-crenate margin. Capsule 25–30 mm. long, oblong, narrower than in the type. Filaments inserted 2–3 mm. above base of perianth-tube. Otherwise as in the type. [n.v.]

γ. *tubulosus* var. nov.

Ajax tubulosus Jordan, Icones Fl. Europ. iii, 4 (1903).

Icon. Jordan, l.c. t. 365.

Perianth-tube very short, only 6–7 mm. long; perianth-segments narrowly lanceolate, acute, not imbricated or twisted, conspicuously exceeding the narrow, slightly lobed and crenate *corona*. Stamens inserted close to base of perianth-tube (ap. fig.). Capsule 20 mm. long, obovate-ellipsoid, bluntly trigonous. Otherwise like the type. [n.v.]

δ. *graciliflorus* var. nov. (fig. 5F).

N. Pseudo-Narcissus subsp. *N. moschatus* race *N. muticus* Rouy, Fl. Fr. xiii, 31 (1912), non *A. muticus* Gay. *N. abscissus* hort. recent.

Icon. Gard. Chron. N.S. xxi. f. 120 (1884), as *N. abscissus*.

Exsicc. Pugsley, No. 486 (type); Burbidge, Hort. Ware (ex Pyrenees), 1876, in Hb. Kew.

Flower of moderate size, drooping, 40–50 mm. long, pale yellow with yellow or greenish perianth-tube and deep yellow *corona*; perianth-tube about 12 mm. long, rather narrow; perianth-segments narrow, not imbricated, as long as the *corona* or sometimes longer; *corona* narrow, with suberect, subtruncate margin. Filaments inserted 3–4 mm. above base of perianth-tube. Style long, sometimes nearly equalling *corona*. Capsule strongly trigonous with flat sides. Otherwise like the type.

N. abscissus is a very distinct Daffodil, characterized by its broad green foliage, very short, often orange-coloured perianth-tube with long, waved segments and long, cylindrical *corona*. It is also peculiar in its non-appendiculate seeds, a feature which it appears to share with *N. bicolor*. The typical form of *N. bicolor* is separable at a glance by the colouring of its flowers, but the variety *lorifolius* is not so easily recognized. From this, however, *N. abscissus* may be distinguished by its smaller bulb, slenderer scape with longer pedicel, narrower, less imbricated perianth-segments, longer, straighter *corona*, and trigonous, less obovate and less furrowed capsules. *N. abscissus* appears to be uniformly a late-flowering species.

N. abscissus is one of the clipt-trunk Daffodils known to the writers of the seventeenth century, and its main features may be deduced from the above-cited account of PARKINSON, for his figure, though crude and inaccurate, sufficiently depicts its general aspect, and PARKINSON notes that it bears a bicoloured flower and is a native of the Pyrenees. Although apparently figured by RUDBECK (*l.c.*), *N. abscissus* was not understood by LINNAEUS, who confused it with *N. moschatus* and cited C. BAUHIN's name (*N. flavus tubo rotundo*) among the synonyms of that species. Similarly the British botanists of the early nineteenth century were not familiar with the plant, which seems to have been no longer in cultivation at that period. HAWORTH, in introducing the species *A. abscissus* in his *Revisio*, bases his name solely on PARKINSON, and adds "Vidi, at non florentem, in horto Hort. Soc. Lond." Later, in the *Monograph*, where this species is placed with four others

with truncate coronas in a separate genus *Oileus*, he remarks, "I have not seen any of these species and insert them with a view to excite enquiry after them." This does not quite agree with the statement in the *Revisio*. It is equally evident that HERBERT did not know *N. abscissus* as a living plant.

N. abscissus appears to have been cultivated in France during the last century, for it was as a garden plant that it was first noticed in 1860 (as *A. muticus*) by GAY (*l.c.*), who had observed its characteristic seeds. Then, two years later (*l.c.*), he identified with this garden plant a form sent from the Val d'Esquierry, above Luchon, in the Central Pyrenees. GAY does not seem ever to have furnished a full description of this species; in addition to the seed character, he simply mentions its broad leaves, reflexed flower, cylindrical and not obconic corona, and its late flowering. But there are good specimens of the plant at Kew, received from GAY, which with the brief description suffice to determine its identity with *N. abscissus*.

In 1883 a variety *lorifolius* of *N. Pseudo-Narcissus* was published by GILLOT (*l.c.*) and subsequently identified with *N. lorifolius* R. and S. by ROUY (*l.c.*). It has been pointed out under *N. bicolor* that this plant, which was wild in the Basses-Pyrénées, was erroneously identified with *N. lorifolius*, and as represented in ROUY's plate, matched GAY's own specimens of *A. muticus*. The *lorifolius* of GILLOT and of ROUY have, therefore, like *A. muticus* Gay, been made synonyms of *N. abscissus*.

The name *N. abscissus* does not appear in BURBIDGE and BAKER's *The Narcissus*, but *A. muticus* Gay is inserted there as a variety of *N. Pseudo-Narcissus*. *N. muticus* was figured, with a brief description, by BURBIDGE in 1876 in the *Floral Magazine* (*l.c.*). *N. abscissus* is given in BARR's List of 1884, where it is shown as under cultivation, and *N. muticus* appears there as a synonym. In the same year WOLLEY-DOD reported (*Gard. Chron.* xxi. p. 617) that *N. abscissus* was common round Gavarnie, in the Central Pyrenees, and that *N. bicolor* grew sparingly with it. The two plants are figured in this volume, and are the variety *graciliflorus* and typical *N. abscissus* respectively. In his *Amaryllideae*, p. 3, BAKER makes *N. muticus* a subspecies of *N. Pseudo-Narcissus*, with *A. abscissus* Haw. as a synonym. It has already been demonstrated that ROUY identified a form of *N. abscissus* with *N. lorifolius* R. and S. Another form is inserted in the *Flore de France* (*l.c.*) as a race *N. muticus* Baker, and of this "*N. abscissus* auct. nonnull. R. and Sch.!" is made a synonym. ROUY has been here misled by SCHULTES' addition (*l.c.*) of Barrelier No. 966 to the synonymy of *N. abscissus*, which is not in HAWORTH's descriptions. This figure of BARRELIER's depicts not an *Ajax* but a *Queltia*, and ROUY, relying on it for the determination of *N. abscissus* R. and S., has applied this name to a *Queltia* hybrid. The plant intended by ROUY as *N. muticus* is apparently the narrow-flowered variety *graciliflorus* of *N. abscissus*, which grows about Gavarnie and has been distributed by BARR and other nurserymen under the specific name. The prevalent form of the species, *A. muticus* Gay

of which authentic specimens are in existence, has been treated as the specific type in view of the impossibility of determining the exact form of PARKINSON's plant on which HAWORTH's name *A. abscissus* was founded.

According to ROUY (Fl. Fr. xiii. 32) *N. abscissus* (*N. lorifolius* Rouy) inhabits the whole chain of the French Pyrenees, as well as the Corbières, and grows also across the Spanish frontier. GAY had it from the Central Pyrenees and GILLOT collected it in the Basses-Pyrénées. In 1925 I saw it in some abundance near Bigorre, and in the Val d'Oo, above Luchon. The varieties *serotinus* and *tubulosus* were obtained near Gèdres. The variety *graciliflorus* (*N. muticus* Rouy) is restricted, according to ROUY, to the Departments of Hautes-Pyrénées and Haute-Garonne, and is said to be common around Gavarnie.

N. abscissus was formerly imported by nurserymen in quantity from the Pyrenees, but is now not often seen in cultivation. The variety *graciliflorus* still grows sparingly on the mound at Kew.

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N.B.—The books to which an asterisk is affixed may be consulted in the Lindley Library at Vincent Square.

EARLY-FLOWERING CHRYSANTHEMUMS.

By THOMAS STEVENSON, F.R.H.S.

[Read Sept. 20, 1932; The Hon. Sir JOHN WARD, K.C.V.O., in the Chair.]

AMONG the many plants grown by amateur and professional gardeners none is more popular than the Early-flowering Chrysanthemum. I do not know one that responds more readily to good cultivation. It is true they will grow anywhere and give a certain amount of bloom with reasonable treatment of the soil, and a fair amount of overhead light and air, but the results of some extra attention are far in excess of the attention given.

It is usual in a paper of this kind to delve into the history of the plant, but I do not propose to do so, except so far as my own knowledge is concerned.

The Early-flowering Chrysanthemum in its present form is of comparatively recent introduction, and I am pleased to be able to number among my friends most of the men who by their efforts have revolutionized this very beautiful type of Chrysanthemum.

Among the earliest introductions into this country were those raised by Messrs. DELEAUX and NONIN in France, and many of those raised by Messrs. NONIN are among our best garden varieties to-day. A few names that come to mind are 'Roi des Blancs,' 'Perle Chatillonnaise,' 'Fée Parisienne,' 'Provence,' 'Normandie,' 'Le Pactole,' and 'Roi des Précoces,' the last being probably one of the parents of some of our brightest coloured varieties of to-day.

A list published by WILLIAM SYDENHAM of Melbourne, Derbyshire, in 1909, included no fewer than 108 varieties of Messrs. NONIN's raising, a wonderful addition to any class of plant, and though he has more or less discontinued raising early-flowering varieties he is still actively engaged in horticulture, raising new varieties of Roses, Dahlias, etc.

But to Messrs. ROOTS of Cranford and SCOTT of Uxbridge must be given the credit of raising some of the best varieties so far. From the latter we have 'Countess,' 'Débutante,' 'Candida' (better known as 'Sanctity'), 'Dorothy Ashley,' 'Mercedes,' 'Delight,' etc.; while from Mr. ROOTS come such varieties as 'Cranford Yellow,' 'Hollicot Bronze' and 'Hollicot Yellow,' 'Hollicot Beauty,' 'Almirante,' 'Cranford,' 'Ashes,' and many others, and though most of those named were raised some twenty years ago they are still grown in hundreds of thousands, chiefly for market purposes. These were the forerunners of the early-flowering, disbudded type, and marked an epoch in the history of the Early-flowering Chrysanthemums.

At the present time there are many raisers in this country—e.g. Messrs. THORPE, SHOESMITH, BARRELL, and WOOLMAN—carrying on

the good work, and especially during the last year or two there have been many new and beautiful varieties placed before your Committee, and the Floral Committee of the National Chrysanthemum Society for awards. These only need time to prove their worth and make them popular. It must be said, however, while there are many fine varieties raised annually that may be really valuable as garden plants, yet there are comparatively few that will stand the test of the market grower whose standard of quality is high—first the plant must be vigorous and able to carry a good crop of bloom without too much manipulation, the bloom must be of a decided colour, of good keeping and packing quality, with petals that are fairly stiff and preferably slightly recurving; the incurving type of bloom is not so useful for actual outdoor cultivation, from the fact they hold the water much too long, though where covering the bloom with lights is practised they are very useful. I might add the foliage should not be too large, and it is a distinct advantage for it to be carried fairly well up to the bloom, thus not showing a long bare neck.

It does not necessarily follow that the type of plant or flower favoured by the market grower is the best for garden decoration. There is a great number of varieties of exquisite colour that, owing to the type or size of bloom, length of stem or habit of plant, are not useful for cutting, but which make a beautiful show in the garden during the late summer and autumn, and such is their recuperative qualities that though they may get a touch of early frost, say, during September, many of them will go on blooming well into October and sometimes even as late as November—quite the latest of our flowering plants for the outside border, and it is really amazing to see what treatment they will stand. The great shows that are made annually in our public parks are usually of plants that have been lifted from where they have been growing during the summer and planted in position just prior to their coming into bloom. True, if the weather be really hot (as this season), they look rather sorry for themselves for a time, but a good watering at the root and an evening spray overhead for a few days work wonders, and they are a delight to the public for several weeks or until a really severe frost comes and stops the flowering of all plants outside.

It is hardly necessary to enlarge on their decorative value as cut flowers in the house. The flood of bloom to be seen in our markets and eventually in our shops and on the streets testifies to the extraordinary number of plants that must be grown to satisfy the demands (though as a grower for markets I know that the demand is more than satisfied), and this encourages me to say that the Early-flowering Chrysanthemum is one of the most important subjects grown for the supply of cut flowers.

As I mentioned in opening, this subject for ordinary garden decoration is quite easily grown, and even for the supply of cut flowers for the home, and if the ground is prepared as for a good vegetable crop it will suit them well, though the position they should be given

ought to be free from overhanging trees. Though they will stand a certain amount of shade and appear to benefit by it during very hot weather, yet it is really prejudicial to the plant, for the growth and flower stems become attenuated and after heavy rain they are apt to flop about and become disorderly, particularly after they commence flowering.

Plants are now procurable so cheaply from nurserymen who specialize in Chrysanthemums that it hardly pays the amateur grower to bother with the trouble of saving stock and propagating plants from cuttings.

Many varieties in an ordinary winter will stand outside and when growth commences in the spring the rooted suckers may be pulled off and planted in small nursery beds prior to replanting in their permanent quarters.

Staking, tying, watering, etc., must be carried out as a matter of routine, and the more thoroughly this is done the more satisfaction it is to the grower.

It is to the market grower that the Early-flowering Chrysanthemum becomes a serious subject for thought and attention. It is to him bread and cheese, and in these times of serious competition he must endeavour to get everything possible out of the plant, and to emphasize the importance of the crop. I will give you a few figures relating to outdoor disbudded Chrysanthemums.

Planted in 3-row beds, rows 14 inches apart and 16 inches between the plants and 2 feet 8 inch paths give 19,602 plants to the acre. An extra penny a plant means a further £81 13s. 6d. an acre.

Spray varieties planted at 12 inches by 12 inches in 3-row beds and the same width paths, 2 feet 8 inches, would be 32,670 plants to the acre, and an extra penny a plant would be approximately £136 2s. an acre.

Certain so-called early-flowering varieties are grown in pots and will be housed, say, at four plants to the square yard over the area of the house. As an illustration, take a house, say 200 feet by 30 feet, which holds 2,664 plants, an extra penny a plant will mean a further £11 2s., so that if by better cultivation 6d. a plant can be added, then a further sum of £66 12s. is realized; thus there is a very decided incentive to growers to spare neither time nor money in the production of good quality crops. There is always some satisfaction in having grown something good, even if it does not realize much money or show, say, much profit. I will now try to give you an outline of Early-flowering Chrysanthemum growing as practised for market purposes or as it may be practised.

CARE OF STOCK.

Stock should be cleaned over and lifted some time during October or early November, but before it has become damaged by severe frost. It should have most of the soil shaken off and be placed in

cool houses or pits, where it may be kept free from frost, but where, after a rest, the temperature may be kept at about 50° or a little over as the cuttings begin to push.

Some varieties that are known to be shy are best housed on a bench or bed where a little bottom heat may be given, and, needless to add, after housing the stock a little fresh sifted soil should be sprinkled over it, but only sufficient to cover the roots. A good rule to follow: The more shy a variety is to give cuttings the more soil should be shaken off, and when the soil is known to harbour slugs it may be advisable to wash all the soil from the stock and partially plant in fresh clean soil.

PROPAGATION.

This may commence as early as it is possible to get the right type of cutting—say for an early batch some time during December or early January, though the main batches of cuttings will probably not be procurable till late January or February, and this date is quite early enough for most varieties.

I prefer to root Early-flowering Chrysanthemums in slightly heated pits with a temperature of 48° to 50° in fairly light soil in boxes of 1½ inches to 2 inches in depth. The temperature should be slightly higher than that of the stock house or pit; here the cuttings will be rather slow in rooting, but after being well watered in they will require very little attention except an occasional spray overhead if fire heat has to be continually used owing to frost.

However, any cool house may be used for the purpose of propagation, but the young plants should be removed immediately they are rooted, to quite cold frames, where they should have all the air possible, or growth will be too rapid. Sand also may be employed for rooting purposes, but to ensure the right type of plant, great care has to be exercised in the after-treatment of the young plants.

CARE OF THE YOUNG PLANTS.

The early batches propagated as described should be nice, stocky plants of from 3 to 4 inches high by the end of February, and as soon as sufficiently hardened I prefer to bed them out in cold frames—with an ash bottom—in 2 inches of soil (not more) about 4 inches apart; from here they will lift with good balls of soil at planting time.

A few days after planting in the frames, all the air possible should be given, and when established the lights removed on all favourable occasions, making sure, of course, they do not get damaged by frost at night, by covering, when it appears necessary, with straw or hessian. The soil on which they are bedded should not be too rich, though, on the other hand, it should not be deficient in the manurial properties necessary to the making of a good plant, remembering always that a starved plant has a tendency to grow tall, while a well-nourished one keeps shorter and produces leaves of good substance,

from the axils of which we are looking for strong shoots to provide us with a good crop of bloom ; and the nearer these shoots are to the base of the plant the less trouble they are afterwards.

Watering has to be carefully done while the plants are in the cold frames, and must not be overdone at any time, and though the plants with the very cool treatment advised may not appear very big or forward by the first week in April, it is astonishing what they will do during that month ; hence be very sparing with the water, or you will have tall, sappy plants that will get a severe check when planted in their flowering quarters, say, the first week in May or even rather earlier, should the weather be favourable.

PREPARATION OF THE GROUND.

As with all crops, the preparation of the ground is possibly the most important factor towards success, and I invariably endeavour to bastard trench all the ground to be occupied by *Chrysanthemums* each year. The amount of manure to be given will naturally vary according to the nature and condition of the soil, but 40 to 60 tons to the acre is not too much where the ground is not already in first-class condition ; this, in the process of trenching, should be well mixed in the soil, not all of it in the bottom spit—say about half and half—and after working, a good liming should be given over the surface, say about 8 oz. to the square yard, but this, too, may be varied according to the natural lime content of the soil.

Except in soils of a very light nature I would not advise too early working ; though heavy soils naturally are benefited by the action of frosts they are also liable to get beaten down and in a sodden condition if very wet weather prevail after working. A good crop of weeds on heavy soil during the winter tends to keep the ground dry and sweet, and were it possible to work such ground thoroughly, say a month to six weeks before planting, it might be found to give better results than working it in mid-winter. I have tried it and found it quite successful.

As I mentioned earlier, no expense within reason should be spared to secure really good crops of blooms. And even with a good dressing of natural manure, it pays, especially with some varieties, to give a fair dressing of artificial manure immediately before planting, and if this is well worked into the soil with a Simar Rotor-tiller to the depth of 6 inches, it leaves the ground in perfect condition for planting. This is a fine labour-saving machine, but do not be tempted to let it take the place of double digging or trenching, or it will tend to act the same as a plough and leave a pan, through which surplus water cannot percolate, and I would suggest that nine-tenths of the diseased foliage often put down to eelworm is caused through a sodden state of the subsoil in autumn.

If through lack of labour or the saving of expense ploughing has to be resorted to, let the subsoiler follow the plough.

PLANTING.

The planting should be done fairly firmly, at the same time giving consideration to the nature of the soil and to the fact that you wish to ensure the roots getting away quickly into the new soil. After planting, water in well once. This may not seem necessary, but it is advisable and certainly helpful, and watered plants will withstand a touch of late frost, where those not watered will suffer badly.

Most growers have their own ideas as to staking and tying. I prefer to use 3-foot stakes to most varieties and secure the plants well at the top break, afterwards wiring and cross-stringing as you would a carnation bed, and if planted in three-row beds as described in my opening remarks it is a simple and quick job, far better than circling the plant with raffia once or twice during the growing season, and much easier for cutting.

STOPPING, ETC.

Except for altering the date of blooming or securing a succession of bloom of a variety over a long period, very little stopping should be necessary if the plants have been grown properly from the outset, though there are some few varieties that have a tendency to throw all their energies into the three top growths. If these are stopped at the first pair of leaves at the first moment possible the energy of the plant is directed into the shoots lower down the stem, and usually sufficient good shoots for a crop are secured, and later some of the top shoots may be removed.

There are varieties, too, that on natural break buds are not good. Such varieties should be stopped lightly about fourteen days prior to planting or immediately after planting in the open ground, taking up three shoots and stopping them again fairly early, remembering the nearer the base a shoot is stopped the longer the resulting stem to the bloom, and with some varieties a little extra length is a distinct advantage.

The plants that are allowed to break naturally will, in a good many cases, have to be reduced to the required number of growths, and wherever possible I like to reduce these shoots from the top. Usually the three top shoots are the shortest, and sometimes too short for the size of bloom they carry, so by reducing the top shoots you get a better average length of stem, but it also means the bloom will be a little later. I aim at an average of twelve blooms from a plant.

When the crop is secured, or the requisite number of shoots are growing away well, taking the buds and removing the side growths must be attended to at the proper time. This, if neglected, will complicate matters, and run on growths on the plants prove a great nuisance and often a loss.

WATERING, ETC.

After well soaking the young plants after planting I very much prefer to try to keep them growing freely by the use of the hoe, and very rarely resort to the hose or water-pot until the bloom buds are well forward. Watering in very hot weather is conducive to a very soft growth which is not the best type to give a good flower, and such growth is liable to mildew, hence I keep off watering as long as possible, and even this season some of my plants have not had any water, though I fully realize that on some soils it must be absolutely necessary to water to keep the plants going, unless the ground has been unusually well prepared, but once watering is started it must be continued and thorough or the cure will be worse than the disease.

To secure really early crops, buds should be ready to be taken at least by July 1, or even earlier than that, so it means that the plants must be encouraged to make rapid, though at the same time the right type of growth.

FEEDING.

If the ground has been thoroughly well worked and manured as advised, very little feeding—if any—should be necessary, and my experience leads me to think that it is better to put what manure is needed into the ground before planting than to give artificial manure afterwards in the form of a top dressing.

The best results are obtained where a deep rooting system is maintained. By top dressing later surface rooting is encouraged, thus preventing the free use of the hoe, and should a drought occur the plants are apt to suffer badly, unless there are unusual facilities for watering. There are, of course, exceptions to every rule, and should the plants at any time get what we term stuck, then recourse may be had to surface feeding. For this, give a dressing of a well-compounded soluble manure, and be sure to give sufficient water afterwards to wash it well down into the soil, and this is difficult.

PESTS.

Like every other crop, the Chrysanthemum has its pests.

Green Fly.—This is easily dealt with by spraying with one or other of the nicotine insecticides.

Thrips, also, is a most insidious pest, and may do a great deal of damage to the young shoots before being noticed, so growers should always be on the look-out for this pest, especially in the early stages of growth, and a good practice is to spray all the stock over once or twice before propagating commences, or it may be found whole batches of young plants will go blind without any apparent reason.

Later, thrips are very troublesome in the early bloom, but if the plants and flowers are sprayed overhead thoroughly with nicotine insecticide at the right strength no damage should result. Choose a

bright drying morning for the operation, so that the plants and flowers dry quickly.

Mildew.—This also is troublesome, but there are many efficient remedies such as sulphide of potassium, $\frac{1}{2}$ oz. to the gallon of water; lime sulphur, too, is good; but do not spray with these overhead: keep it down among the older foliage where mildew is most likely to appear.

Early-flowering varieties under glass, and late ones too, may be kept perfectly clean if immediately after housing they are vaporized with sulphur, using a Campbell's vaporizer, but on no account must the lamps be allowed to ignite the boiling sulphur; hence, see the little glass balls do not get stuck down.

The Bishop Bug—*Lygus pratensis*—is also troublesome in some localities, and to some extent it may be coped with by using a heavy soap and nicotine spray, but it has to be so heavily charged with soap that two or three sprayings will do as much harm to the plants as the bug itself. It is best to go over the plants early in the morning, when the insects are more or less inactive and kill them. Spraying for this pest should be done quite early in the morning.

Ground Caterpillars, too, in some seasons cause serious damage by eating the bark of the plants just below the surface of the soil, and unfortunately much damage is done before it is noticed. Trapping the moths in late June or early July is a useful precaution, using a mixture of stale beer and treacle placed in jars among the plants. When the caterpillars get to work, sprinkle lightly around the plants a mixture of bran, treacle and Paris green.

Eelworm I have never known damage the plants where the ground has been deeply worked and where all surplus moisture could get away from the roots. A sample of cuttings sent for examination and pronounced as being very badly infected made some of the finest plants I have seen, and certainly carried bloom of exceptional quality, the variety being 'Sanctity.'

Frost protection.—Though the amateur who grows his flowers as a hobby may take the risk from early frosts, and though they, if slightly frozen, will recover and continue to make a brave show in the garden for quite a long time, yet the market grower, except in the case of a few varieties, must, as a safeguard, be prepared to cover his plants, for once they get even slightly frozen they are seldom much use for sale in the markets, or the amount of time to be expended in picking over the damaged blooms will be in excess of what it might have cost him to cover. The usual practice is to cover the whole of the ground in which susceptible varieties are planted (*i.e.* all but the first earlies) by putting up a system of posts and battens at distances varying from 10 to 12 feet each way and covering with canvas. Run the canvas in the opposite direction to the rows of plants, button the canvas (usually 6-foot widths) to the batten securely and tie back at frequent intervals, spreading it only in case of frost. The posts should be 6 feet 6 inches clear of the ground, so that the canvas, when spread, is well clear of the plants.

A few good varieties for cutting (disbudded) are :

'Mrs. J. Pearson'	'Hollicot Beauty'
'Mrs. Phillip Page'	'Trigo'
'Rose Précoce'	'Arcadian'
'Hollicot Yellow' and 'Bronze'	

These you may reckon upon for a crop before there is any danger from frost, but much depends upon the locality where they are grown. The following, however, should have provision made for covering them, bearing in mind bloom is more valuable after there has been sufficient frost to clear off the unprotected varieties :

'Alcalde'	'Yellow Gown'
'Almirante'	'Sanctity'
'Autumn Gold'	'Delight,' and innumerable others.
'Winnie Avery'	

Probably the best early-flowering varieties for pot cultivation are :

'Countess'	'Mrs. R. C. Hamilton'
'Débutante'	'R. A. Roots'
'Cranford Yellow'	'Mercedes'

For cutting in spray form and garden decoration the following may be relied upon :

'Cranford'	'Golden Phoenix'
'Daffodil'	'Ashes'
'Phoenix'	'Mrs. J. Pearson'
'Mrs. Phillip Page'	'Crimson Fourex'
'Betty Sparks'	'Provence'
'Perle Chatillonnaise'	'Horace Martin'
'Martin Reed'	'Roi des Blancs'
'Royal Salute'	'Mayford White'
'Crimson Circle'	

For really dwarf bedding varieties we have :

'Pleuie d'Argent'	'Dorothy Ashley'
'Polly,' yellow and crimson	'Mayford White'
'Dandelion'	'Elsie Heady'

There are also a few early-flowering Pompons that are quite good, such as 'Mrs. Sully,' 'Pinay's Seedling Anastasia,' 'Flora Barr,' 'Robin,' 'Claude Briere,' and 'Bronze Anastasia.' Whilst for the amateur who wishes to specialize in a few large blooms of the early-flowering type planted in the ground, the following are to be recommended :

'Bronze Early Buttercup'	'Shirley Fawn'
'Don Bradman'	'Shirley Pride'
'Herbert Sutcliffe'	'Chamois'
'Silver Queen'	'Rose Précoce'
'Salmon Queen'	

PLANT COLLECTING AT THE SOURCE OF THE IRRAWADDY.

By CAPTAIN F. KINGDON WARD, V.M.H., F.L.S., F.R.G.S.

[Read June 7, 1932 ; Sir DANIEL HALL, F.R.S., in the Chair.]

THE PRESIDENT : Captain KINGDON WARD, Ladies and Gentlemen,—We have assembled here this afternoon to hear what I know will be a lecture full of interest to us as plant lovers, and full of adventures undertaken by Captain KINGDON WARD on our behalf. But before asking him to begin his lecture I have been asked by the Council of the Royal Horticultural Society to present him with the Victoria Medal of Honour and the corresponding certificate which have been awarded him by the Council. He has already been the recipient of awards from the Royal Geographical Society and other bodies almost too numerous to mention, and it is fitting that the Royal Horticultural Society should present him with their premier award in that he has done so very much to beautify our gardens and has done it in many instances at the risk of his life and of his health. If there is anyone who deserves an award from gardeners it is one of that gallant band of explorers who go out to far regions and collect for us.

We never quite know whether we prefer Captain KINGDON WARD present and moving among us and lecturing to us, or whether we prefer him absent and collecting for us in far countries, but we rejoice to have him present on this occasion, because it gives us the opportunity of presenting him with this Medal. Captain KINGDON WARD, I have very great pleasure in presenting you, on behalf of the Royal Horticultural Society, with the Victoria Medal of Honour.

Captain F. KINGDON WARD, V.M.H. : Mr. President, Ladies and Gentlemen,—Before I start my lecture I should like to thank the President of this Society for the honour he has done me in giving me this greatly appreciated Medal. At the same time, sir, I would say what I think was said by Laocoon in Troy some years ago : “ I fear the Greeks even when they bring gifts,” because there is attached to this honour the penalty that I have now to give a lecture. Whether I who have to give it, or you who have to listen to it are the more to be commiserated with I am not prepared to say.

I think it will be more convenient from the point of view of horticulturists and botanists to consider the country we are about to visit as arranged in a series of layers or belts of flora. I shall try to name a few of the most characteristic plants which grow in each of the belts and say something about the conditions under which they grow. Of course, having regard to the actual conditions up in the mountains—that is to say, conditions of soil and aspect and rainfall and the length

of time that the snow lies—it would be possible to subdivide these belts very considerably into a number of plant associations, but I do not want to go into that now. In so far as it affects us as gardeners, I will deal with it as it comes along. I am dealing in generalities, and it is convenient to divide the whole of the flora into seven main belts.

The country that we visited is the source of the Irrawaddy. I shall imagine that we are on a magic carpet and are wafted straight away to the headwaters of the Irrawaddy.

It is very much easier to work from the general to the particular ; so I will just enunciate three general facts before getting on to the more detailed work. Firstly, the whole region in which Lord CRANBROOK and I were working last year, the headwaters of the Irrawaddy, lies between the parallels of latitude of about $26\frac{1}{2}$ and $28\frac{1}{2}$ degrees north of the Equator—that is to say, it is about 5 degrees north of the northern tropic, and is roughly in the latitude of Northern California, Northern Florida, Cairo and Shanghai.

Secondly, the whole of this region lies within the monsoon belt.

Thirdly, the whole country is very highly mountainous and covered with dense forest. There is no vestige of a plain anywhere and we worked our way gradually from a few hundred feet above sea level to something over 15,000 feet above sea level, the source of the Irrawaddy, which lies a good deal higher than the average height at which aeroplanes normally fly.

With regard to these three generalities : first of all, latitude. I need only say that the sun at midsummer is very nearly vertically overhead, and therefore a good deal higher than it is in this country—the latitude of London is about 23 degrees further north than the country in which we were working. Of course, with the sun vertically overhead you get very much hotter summers and the sun is able to penetrate into deep and narrow gorges where in higher latitudes that would not be possible. Another effect of this particular belt of latitude is that the days throughout the year are much more equal—that is to say, in summer the days are shorter than in this country, but in winter they are longer. There is nothing like the twilight that you get in England, nor are there, on the other hand, any nights quite so long as our very long winter ones.

As regards the monsoon belt, as you know the typical monsoon climate is one in which occur alternations of rainy seasons and dry weather. For instance, in Lower Burma there are about five months rain followed by something like six or seven months of fine weather. The fine weather is divided into two periods, cold dry weather and hot dry weather. In Rangoon the cold weather is a good deal warmer than June in England—at any rate than this June—and the hot weather is considerably hotter than anything we are accustomed to in this country. The rainfall when it comes is very severe, but in the mountainous country to which we are going this monsoon climate is very much modified. Instead of the fine winter and spring there is rain, and higher up, of course, snow ; there is practically no season of

drought at all and water falls at all seasons of the year, either as rain or as snow.

All these factors greatly affect the flora, and the conditions in which plants grow out there, and those in which we try to make them grow here, are naturally very different. Now the monsoon climate always favours the growth of trees, so that wherever you are in Burma, whether in the tropical belt or right away up north near the Tibetan Plateau, the whole country is covered with dense forest. These forests vary in composition and in their general character according to the amount of rainfall. In Lower Burma the monsoon forest differs from the equatorial forest only in the fact that for a short period during the hot, dry weather a good many of the trees lose their leaves—it is deciduous forest. In the mountainous country, with rain at all seasons of the year, the forest is mainly evergreen, and it is not till you get up to the snows that you begin to find ordinary, deciduous forest such as we are accustomed to in this country.

I propose to jump now to the headwaters of the Irrawaddy, and taking the forest belts that we passed through when climbing from a few hundred feet above sea level to about 15,000 feet, in turn, to discuss some of the plants especially that I brought back from this trip; I shall also raise the question as to whether they are likely to prove hardy with us or not.

The first belt we passed through when we left the railway and started on our journey was sub-tropical jungle. This sub-tropical jungle is of very little interest to us, because the plants from it are naturally not hardy. Almost the only plants which come from the sub-tropical jungle of any great interest to horticulturists are a few orchids. Being a rainy country, with rain at all seasons of the year, the sub-tropical forest is mainly evergreen. The plants are awake and growing all the year round, because the winters are not sufficiently cold nor the hot weather sufficiently dry to stop growth. Since there is rain at all seasons, the plants are able to keep green.

Our starting-point is Rangoon, thence to the railhead, and then we have to use other means of transport, either coolies or mules; it takes about seven weeks to travel from railhead into the area explored.

We went up through Burma to Fort Hertz, which is the last civilized outpost where we saw a white man. I made journeys in 1924-26-28, and in 1930 we were there, but the whole of that country to the north, west and east is entirely unexplored from every point of view. There is about 25,000 square miles of mountainous country entirely untouched. Those people who think plant-hunting is played out might perhaps cogitate on that.

Above the sub-tropical jungle we come to the hill jungle, which extends from about 3,000 to 6,000 feet. This covers all the lower hills away from the big snow mountains. It gets rain at all seasons of the year and is a very moist, damp country which suffers neither from frost nor drought. Like the lower country it is covered with

dense, more or less evergreen, forest. There is a good deal of bamboo undergrowth, which makes the forest extremely difficult to get through; you often have to cut your way through these damp forests. The trees are much the same as in the lower belt, the sub-tropical jungle, but there are also a few interesting herbaceous plants. On the outcrops of rock grow a good many Begonias, some very striking, and there is one species of considerable interest.

In the hill jungle, about 6,000 feet above sea level, there are several very striking trees, including *Bucklandia populnea*, but they are not likely to be hardy in this country. One of the best is *Eriobotrya Wardii*. Small shrubs, like *Euonymus* and *Eugenia*, abound, but in all this forest country herbaceous plants are comparatively rare, and the trees not being hardy, it is not of great interest to the horticulturist. The Rhododendrons, of which there are perhaps half a dozen species, are nearly all epiphytes—that is, they grow on other trees.

The most interesting herbaceous plant from this particular belt is a *Cypripedium*, which is going to flower this year. The reason why the small trees and shrubs from the hill jungle are not likely to prove hardy in this country is not because of the frosts, but because in Britain the air, except near the coast, probably gets much too dry. One must remember that the condition of the atmosphere which surrounds the plant is probably just as important as the state of the soil, and if the atmosphere gets very dry, no doubt a great many plants are unable to survive during certain critical periods of their life.

In the valleys you get one type of hill jungle and on the hillsides or higher up on the ridges another type, but it is all more or less uniform, evergreen, dense forest. I pass over this as quickly as possible because from the point of view of the horticulturist it is not very important.

In the valley of this same temperate rain forest, at about 5,000 feet altitude, there is very dense forest growth, but it gets quite cold here in the winter, although there is no frost. There is a little Rhododendron growing up there (*R. dendricola*), like nearly all the Rhododendrons in this region, an epiphyte.

The next belt is the temperate rain forest. We have been through the sub-tropical jungle, through the hill jungle, and now we pass into the temperate rain forest belt.

The actual altitude is not much more than in some of the other districts, about six to eight thousand feet, but there is this great difference: the temperate rain forest is in the close neighbourhood of the snow peaks. It is, therefore, very much colder in the winter, and not so hot in the summer. Snow falls, but it does not lie to any extent at 6,000 feet; it lies a little at 8,000 feet. About a third to a quarter of the forest is deciduous. There are a few conifers, *Pinus excelsa*, *Podocarpus* and one or two others, but it is chiefly remarkable for its Rhododendrons and its Ericaceae. Twenty or thirty species of Rhododendron occur in this belt—between 6,000 and 8,000 feet.

There is a certain Cherry which I call the Carmine Cherry—it may be *Prunus Puddum*—which is not ordinarily a hardy tree. Amongst the big trees is *Michelia doltsoa*. The Rhododendrons are mostly small, a good many of them are epiphytic, but they vary greatly in size from a tree 50 to 60 feet high bearing an immense number of trusses of rose-purple flowers—I shall probably call it *Rhododendron magnificum*—to tiny little scrubby plants like *R. insculptum*, which has brilliant orange flowers, but which I am afraid will not grow in Britain.

In the spring one of the most noticeable features was the wonderful foliage of the young leaves and breaking buds, particularly amongst the Lauraceae and some of the Ericaceae, *e.g.* *Pieris*, *Gaultheria* and *Vaccinium*. Amongst the deciduous trees was a very beautiful species of *Cercidiphyllum* which may be new.

In March the first signs of spring begin to appear when all the plants come into blossom. The mountains are extremely steep and the valleys are very narrow, so that even with the sun travelling in a high arc at midsummer, straight over the valley, it did not shine into the narrow gorges for very many hours, and the difference in the vegetation on the two sides was astonishing. You find on this exposed side *Pinus excelsa*, a number of rather stunted bushes, and higher up, forest. On the shady side you get dense forests of much more tropical-looking and more evergreen trees in greater variety. The sun used to set behind this range early in the afternoon even in midsummer, and the whole of one side, owing to the height and the steepness of the mountains, was thrown into deep shadow, whereas the sun continued to shine on the other slope. The average slope is about 45 degrees, so you can imagine the toil of climbing up and down every day.

Michelia doltsoa is the earliest tree to flower in this belt; I think it is worth cultivating, if hardy. It grows about 60 feet high. It is practically evergreen, and we noticed what was extremely interesting—when we had a snowstorm the whole of the flowers would be practically killed off, and after a few days the whole tree would be covered with flowers once more. It seemed to keep serial flower buds ready, and when one lot died off the next lot came on as soon as the weather was a little less inclement. It was a very common tree, especially on the sheltered side of the valley, and grew as low down as 5,000 feet and as high as 7,000 feet. The higher trees are in flower about April.

Decaisnea insignis is very common and was a beautiful sight in the early morning when all its flowers were dripping with dew. We used to see the sun just peeping over the ridge of the mountains and striking through its long festoons of flowers, making the dew-drops glisten like diamonds. It is well known in cultivation in this country, and is certainly worth growing in any position where one can get the sun shining through these tassels.

Amongst a great variety of shrubs the species of *Euonymus* are as interesting as any; they have tiny little chocolate flowers hanging in great showers from all the branches. There are at least half a dozen

species, nearly always chocolate-red, and much more beautiful in fruit than in flower ; at the same time, when they are massed they are very fascinating. The difficulty is they never seem to produce anything like the same number of fruits as flowers. The fruit is, of course, a capsule with brilliant orange-red seeds dangling half out of it.

There are a fair number of climbing plants in this belt, including a most wonderful Clematis with vast stems. It grows about 100 feet high and flowers in November, with bright Crocus-yellow flowers. There are many other climbers, Schizandra, Vitis, and things like that. There are very few winter-flowering shrubs here.

The well-known *Rhododendron Nuttallii* is very common here, and practically always found growing on the river bank, either on a big boulder, so that it can hang out into the river, or sometimes on a tree. It grows like any other *Rhododendron* and then generally forms a tall, thin stem, and leans out right over the river. Obviously it craves the light.

Naturally there are not very many herbaceous plants in this temperate forest belt, because the forest is so dense. You only find herbaceous plants as a rule growing in open places, but there was one very interesting *Primula* closely allied to the well-known *Primula obconica*. I was very interested in this *Primula* for a quite definite reason. The *P. obconica* from Eastern China is a plant which has not made quite the progress in horticulture that one hoped it would. The reason seems to be that it is covered with irritant hairs and the handling of the plant is apt to cause a rash. A good many years ago the late G. FORREST found in Western China *P. sino-listeri*, a close ally of this *P. obconica*, but without the irritant hairs ; that has come on in horticulture, but it is not quite hardy. Much further west, in the Himalayas, occurs *P. Listeri*, which is not common. That plant has a property which neither of the other plants has. It smells very strongly all over like the ordinary Herb Robert of the English roadside, *Geranium Robertianum*, which is not a horticultural favourite—Herb Robert does not smell very pleasant.

The *P. obconica* that we found has neither the irritant hairs of the original *P. obconica* nor the strong smell of the Herb Robert. I do not know what to compare it with, for I have never smelt anything like it. The whole plant is sweetly fragrant, not the flowers only, and is very attractive from that point of view. I do not say it will be any hardier than any of the others, but it does not seem to be irritant, and a few plants will scent a whole greenhouse, so it might be a plant with a horticultural future.

On the cliffs and screes here grow various herbaceous plants, particularly a rather fine flag Iris with pale blue flowers. There may be a future for that plant, but it is difficult to say whether plants from this belt will be hardy. People often ask : " What height did that plant come from ? " When I reply " 7,000 feet," they say " Then it will not be hardy in this country." I admit the chances are against

it, but I do not think that is a criterion which you can always apply. I am perfectly sure that quite a number of plants from 7,000 to 8,000 feet will be hardy in this country although a great many others will not be. Altitude is not of itself of such prominent importance that you can definitely say this plant will be hardy or it will not. We do not yet know sufficient about what constitutes hardness to be certain. It is, I admit, a fair guide, and certainly it is the only one we have to go by ; on the other hand, you really want to try the plants out before condemning them. The conditions under which plants grow in this temperate rain forest belt are : rain at all seasons of the year ; in the summer hottish weather, hotter than England, and the winters not as a rule quite so cold as in England ; snow falls as low as 6,000 feet, but it does not lie ; in the upper belt at 8,000 feet it lies considerably longer ; generally speaking, there is no season of drought, and you do not get parching winds. The spring winds on a hot day come up these gorges as tremendous blasts of air, blowing for a couple of hours, but they are of short duration ; and then the next night it is raining again and the air becomes moist once more. The conditions are not so different from those of England. But you are always up against this difficulty, that throughout this forest country the atmosphere is generally almost saturated day and night. As you know, the actual amount of vapour present in the atmosphere depends on the temperature, but there is a saturation point for any given temperature, and here it departs from complete saturation only to a small extent, whatever the temperature, and never for very long at a stretch. The average vapour pressure varies between 60 per cent. and 70 per cent. day and night throughout the year.

Now for a few climbing plants. There are several species of Clematis, and one of the commonest climbers in the upper part of the temperate rain forest is *Aristolochia Griffithii*, which I have made one or two attempts to introduce, but, I am afraid, without success. It is a queer, grotesque plant, not particularly beautiful, but if you want to give anybody a surprise, it would certainly do this. We used to call it the " Stinking Saxophone " ; it is shaped like a saxophone and has a most horrible smell.

Another plant we have been trying to introduce for a good many years is *Viburnum Wardii*. It is a beautiful sight as a small tree, but the fruits ripen very suddenly and fall to the ground ; and after the journey of a couple of months to England the seeds seem to lose all their vitality. I found a dwarf form at 12,000 feet, and I concentrated on trying to get that home alive. A plant well known to you by name, although it has not yet flowered in this country, is one of the big trees of the temperate rain forest, *Magnolia rostrata*, very handsome as to its leaves, but with disappointing flowers. It is known to flower when it is in full leaf, and the flower is white and ridiculously small for the size of the leaves, and it is difficult to see them because the leaves hide everything. If you can look down on it from above it is not too bad, but it is not what one thought it might be. There are certainly

far better species of *Magnolia* cultivated already. Of course it is deciduous.

We are apt to get a bit light-headed over *Rhododendrons* and to forget there are other *Ericaceae* almost as beautiful. Among them are some of the *Vacciniums*. One which we found growing at 5,000 feet has leaves snow-white below and large bunches of grape-like fruits.

We now pass on to the next belt, the upper temperate rain forest or conifer-*Rhododendron* forest belt, roughly from 8,000 to 10,000 feet. At this time in 1931 we were in camp under the enormous trees there, mostly *Picea Morinda*, *Tsuga Brunonian* and *Pinus excelsa*; other conifers which grow there are *Larix tibetica* and *Juniperus recurva*. This is a continuation of the lower temperate forest, with a similar climate, very moist atmosphere, a considerable continuous rainfall at all seasons and moderate temperature, though much colder in winter. At 8,000 to 10,000 feet the snow lies for three or four months in winter. I was scouting up here in March and April, looking for camping sites, and it was all under deep snow even then; the snow lies a good long time underneath the trees. Other trees besides the conifers are species of *Ilex* and *Oak* and numerous species of *Acer*. Perhaps a quarter of the tree species are deciduous. There are a good many species of *Rhododendron* which belong entirely to this belt; some of them, like *R. arizelum*, form forests by themselves. When you look straight up the mountain-side, sloping at about 60 degrees, in June you see the whole slope simply one blaze of *Rhododendron* blossom.

The slopes are very steep, the vegetation dense, and the difficulty of ascent great. On account of the perpetual mists and rains blowing through these forests the trunks of the trees are shrouded in dense growths of moss, and it is in this moss that the *Rhododendron* seedlings come up in great numbers; a great many *Rhododendrons*, as I said before, are epiphytes. The highest *Magnolia* in this belt is *Magnolia globosa*. It goes as high as 10,000 feet. I do not think very much of it; the flowers do not show up very well, though it has good foliage. These flowers look like white, semi-pendent globes scattered all over the tree. I do not think it is the equal of *M. Wilsonii* and one or two others, but there are people who think that all *Magnolias* are well worth growing, so I will not hurt their feelings by decrying this one too much.

Rhododendron sino-grande, one of G. FORREST's discoveries, is a very fine tree, but not always quite hardy in this country, except in the wetter parts of the west, but it seems to vary. Some forms are hardier than others. It has magnificent leaves, the flowers are pale cream, and certainly a tree of *R. sino-grande* in full bloom is a very remarkable sight.

Another typical *Rhododendron* is *R. vesiculiferum*, rather after the style of *R. barbatum*, but with purple flowers, always with a dark, gloomy blotch at the base. According to altitude and situation it

varies in size: it may be a small shrub or quite a moderate-sized tree.

There is also a prostrate *Rhododendron* which has been shown recently—*R. patulum*. It seems to be quite hardy and is well adapted for the rock garden; it lives at 9,000 to 10,000 feet.

Then there is *R. heliopsis* with very aromatic leaves. When brushing through thickets of that *Rhododendron* the whole air is scented. This is the eastern form of the well-known *R. Falconeri* of Sikkim, the Chinese form (*R. arizelum*). It is found from the eastern Himalaya to China and varies in colour, being either pink or yellow. A good deal has been made of the variations in colour of certain species of *Rhododendron*, such as *R. apodectum*, but you get colour variation in quite a number of species. I cannot say it is the rule, but it is a very common thing for us to find one or two species in almost every series which have a considerable range of colour. This is certainly one. The curious thing is that the yellow-flowered forms tend to grow together on one side of the valley, and the pink-flowered on the other side; they hardly ever seem to mix.

The little epiphytic *R. bullatum* looks like a lot of butterflies flying about in the forest, for you may see its little flowers peeping out amongst the branches here and there with the sun shining through. It is a charming plant, not quite hardy in most parts of this country.

Big dark patches are seen on the trees and are simply clots of moss. It is amongst these that so many seeds blown by the wind germinate; you can see little *Rhododendrons* growing, and if you peer into these clots of moss you find them covered with seedling *Rhododendrons* and a few *Orchids*.

Juniperus recurva is, for instance, draped with moss. That gives you an idea of the tremendous humidity. This moss could not live on the tree unless the air was saturated with moisture always. It is nice for the plants, but beastly for human beings.

In the next belt grow the last of the tall *Rhododendrons* in the upper temperate rain forest, and we are now going to ascend to the last belt of forest, the *Abies* forest. There is practically no other tree mixed with the Silver Fir and it extends from 10,000 to 12,000 feet, where it peters out altogether. This is not a belt where you find many Alpine plants, except that all these rubble chutes carry Alpine plants down to as low as 9,000 feet. The reason is obvious: you have these narrow, steep gullies always being bombarded with rocks, so that trees cannot grow—if they spring up, they are quickly smashed; there is a certain amount of soil, and the snow is shot into the gullies and does not melt until July or August. The only things that can spring up are Alpine plants, which come up as fast as the snow melts, and they cover the base of these gravel cones right away down into the forest belt. There you find plants like *Nomocharis pardanthina* with ten or twelve blooms. Another plant of the scree chutes is *Aster fuscescens*, a charming many-headed *Aster*.

Next we come to the Alpine region, above the last forest belt, where we find dwarf Rhododendrons among other shrubs growing higgledy-piggledy, like Heather in Scotland.

In all the open and boggy places you find Alpine flowers in great variety. Here we lived for four months last year. We reached there about the 12th of June; a great deal of the valley was still under snow, but the steepest gullies were clear of snow and we used to climb up these looking for plants. On these screes and cliffs most of the Alpine plants were found.

You will understand that in these mountains altitude corresponds to latitude—that is to say, climbing up from 3,000 to 12,000 or 15,000 feet in this particular latitude is very much the same as travelling northwards some thousands of miles from the Equator towards the Pole. It is a dangerous analogy which, although useful, must not be pushed too far. Travelling from the Equator to the Pole you pass through, first of all, equatorial forest, then temperate forest, then conifer forest, and then the meadows and steppes of Europe, and then the tundras, semi-desert, and finally the Polar regions where no plants grow at all. You have the same thing here: you pass from the sub-tropical jungle to temperate rain forest, half deciduous forest, and finally into this tundra region and screes, to the bare tops of the cliffs, where nothing grows at all.

In the Alpine region the plants flower in waves. In June you get many Primulas, most of the Rhododendrons, Willows, Gaultherias and Vacciniums. In July, *Nomocharis*, *Meconopsis*, *Corydalis*, *Iris*, *Anemones* and several Orchids. You will be surprised at the number of Orchids that are found in these cold regions; they are ground Orchids, not epiphytic. In that zone you get the quaintest little ground Orchids; they are not of much use for horticulture, but some are extremely fragrant and would be well worth growing for that reason. In August you get Saxifrages, *Pedicularis*, Asters, *Cremanthodiums*; in September, Gentians, *Cyananthus*, *Delphiniums*, and *Aconites*—right up to the middle of October you find flowers wherever the snow is melting; as fast as the snow melts these things come into flower.

Curiously enough, we did not find *Meconopsis betonicifolia Baileyi* this year, although we were only 25 miles away from where I found it in 1926. It did not grow in this particular valley. That just shows you how extraordinarily localized these plants may be. We were thirteen months in the field last year and we never saw that plant, and we could have come back and said that the plant does not occur here at all, yet 25 miles away it was growing by thousands.

The screes are like the flat tundras of Northern Siberia for the amount of vegetation they carry; once you get above the trees and shrubs the rest is semi-desert tundra. During three or four months plants grow violently. There is ample water and just sufficient heat for them to grow lushly, and then for about eight months in the year they lie under the snow.

Still higher up you find on the more sheltered side of the valley scrubby *Rhododendrons*, and on the exposed side practically no plants at all. Scattered about over these screes you find one or two curious plants like *Saussurea*, most of which, as a matter of fact, will not grow in this country.

I have always thought myself that the reason we could not grow these very high Alpines was simply because they are so like Arctic plants, and one could hardly expect to grow Arctic plants in a temperate climate. That, however, is no explanation. But it may not be anything to do with climate at all. It may be something to do with the soil. Until we have carried out a series of experiments in this country as to what the real effect is of prolonged burial under snow, we cannot say definitely what our troubles are. Of course there is obviously a mechanical effect from the pressure of the snow. That may not have any particular bearing on the question. There is also the possibility that the snow kills or checks a great many soil bacteria or that it has a sterilizing effect. There is a wonderful field for research as to the effect of snow on plants.

I say I do not think it is merely the effect of altitude, because last year I brought home plants alive. I dug them up in the mountains, carried them down to my camp, kept them there for a few months, and when we packed up I put these plants into boxes and they had to go through the Tropics, and cross the sea, and it was four months before they were planted in this country. These were not shrubs and trees but herbaceous plants. I do not know what proportion of them survived, but I do know this, that a *Primula* (*P. Dickieana*) which we have never been able to raise from seed is now alive and is going to flower next year; there are probably forty or fifty living plants at Kew. There are some *Gentians* and *Willows*, *Polygonums* and even a *Cremanthodium*, all doing very well.

I always feel it is up to the plant hunter to try experimenting a bit more. Seed is undoubtedly the safest way and the easiest way of bringing plants home to this country, but it is worth while trying various other means and to keep on trying them. I rather feel that the plant hunters of the next generation will be bringing back, not so much seeds but whole plants, either alive and growing in glass-houses or, as I brought them, alive but dormant, packed simply in wooden boxes.

With regard to these Alpine plants, you must remember that for six months of the year in their own homes they are absolutely static; they are not growing at all. If we could bring them home, keeping them asleep, without disturbing them, there is no reason why they should not wake up in June, just as they do in their own country when the snow melts, and grow perfectly well.

The bringing home of seeds in carbon dioxide has proved very useful and further experiments should be made by plant hunters both as to keeping seeds alive on these journeys and bringing home living plants.

In the high Alpine regions the majority of the plants likely to be hardy are found, and among them several little creeping *Gaultherias*, which are very beautiful in fruit.

Finally we come to the Arctic zone, where there is practically nothing in the very deep gorges, especially those where the sun never reaches, where the snow may lie until September or October. It is very remarkable that when the fine weather comes at the end of October and the beginning of November the snow is still melting, and as fast as it disappears up come the plants even as late in the season as that. As far as I see they have not a chance of being pollinated, they are only in bloom a week, another snowstorm comes and they are immediately buried. They do make every effort to grow, and we cannot blame the poor things if they are not always happy in this country ; they do their best and they have very elastic constitutions.

THE CULTIVATION OF VIOLETS.

By HENRY H. COOK, Reading University.

[Read March 22, 1932; the Rev. H. ROLLO MEYER in the Chair.]

SOME time ago, when looking through some old papers, I came across an appreciation of Violets by JOAN B. WHITE. It is such a beautiful description of the modest Violet that I may be pardoned for prefixing it to my lecture this afternoon.

Violets—

Downcast, dew-drenched eyes—
 Summer's breath 'neath winter's skies.
 A softer purple than the vine's ripe fruit—
 A fragrance sweeter than the orris root—
 More haunting still than merle's flute—
 Violets.

It would be quite safe to say that of all the flowers which we have during the winter months none enjoy such a wide range of popularity as, nor give a greater amount of pleasure than, Violets. Their delicate beauty and fragrance are quite sufficient to account for this, but the further fact that they give of their best when other outdoor blooms are scarce has something to do with the universal affection with which they are regarded. Though so dainty and fragile, when gathered Violets do not droop as quickly as most other flowers, and owing to this quality they have been the means of conveying to many a sick-room a breath of health-giving freshness.

The sweet Violet—*Viola odorata*—is, in colour, white, deep purple, or occasionally lilac or reddish-purple, and is the parent of all the sweet Violets in cultivation to-day. *V. odorata* is found all over Europe and in many parts of Asia. I do not intend to go into the history of the Violet, but would refer you to the very fine account given by Mr. J. C. HOUSE (see JOURNAL R.H.S. 43, p. 16). It may, however, be of interest to note that in "Piers Plowman" we read that during the fourteenth century the practice of gardening soon spread among the more peaceful subjects of the King, and that their gardens were usually enclosed by high walls or hedges "wherein they grew periwinkles, marigolds, roses and violets." This record, if authentic, goes to show that the sweet Violet was a cultivated plant in this country from, comparatively speaking, early times.

Before undertaking the cultivation of Violets there are several conditions which require to be seriously considered, if the plants are to be well grown. One of the first essentials in their successful cultivation is a pure atmosphere. They will not thrive in or near large towns, where, more often than not, the air is impure, nor will they flourish in a district which is subject to fogs. The situation should be open,

though some shelter from east winds is very desirable. The question whether Violets should be grown in shade, partial shade, or in full sun, is often debated. Before this question can be answered satisfactorily one or two points require careful consideration, and these largely concern the physical condition of the soil in which it is intended the plants are to be grown. When we speak of soils being light or heavy we do not refer to their weight, but to their texture or to the degree of resistance offered to the spade or fork when they are moved. In this respect sandy soils are the lightest to work, but in actual weight they are the heaviest. Light, sandy soils dry out quickly in summer, while the opposite holds good in respect of heavy clay soils. If, therefore, I were obliged to grow Violets on a light soil I should, naturally, choose a position which was, for the greater part of the day at least, somewhat shaded. On the other hand, had I a stiff, retentive loam I should unhesitatingly plant them in full sun. Some Red Spider I should be almost certain to get, but I would much rather run the risk of getting this pest than end the season by having badly ripened plants bearing indifferent blossoms and a prey to that dreadful disease—American Spot of Violets. The choice of position must therefore be regulated considerably by the latitude of the district, as well as by the physical and natural fertility of the soil. In the southern counties of England, or where one has to deal with a quick-drying, shallow soil, a position shaded from the fierce rays of the sun during the hottest part of the day is best; hence it is that a border on the shady side of a hedge, or, failing this, a situation where tall but distant trees cast their friendly shadows at midday, is generally chosen. In the northern counties the matter of shade is unimportant. The lower range of temperature and more cloudy atmospheric conditions account for this, for, taking the average over a number of years, it is found that the plants do better fully exposed to the sun than otherwise, as the greatest enemy of the Violet—Red Spider—is seldom troublesome there.

Another point which may have a bearing on the selection of the site is whether the plants are to be lifted the following autumn and planted in pits or frames, or have frames placed over them. One of the most successful growers I know plants his Violets in beds, the rows running from east to west, four rows to the bed, the plants being set out at 14 inches apart each way, and at a distance of 3 feet between the beds. The varieties used are 'Princess of Wales,' 'Princess Mary,' and 'Mrs. Lloyd George.' The last, which does not make such large foliage as the first two, are planted only 12 inches apart in the rows. Early in October 12-inch by 2-inch planks, set on edge, are placed around the beds, the planks being held in place by 3-inch by 2-inch posts driven into the ground, and so arranged as to take lights measuring 5 feet 6 inches by 4 feet. Under this system the grower is saved the considerable labour which would be incurred had he to lift and replant all the Violets he grows. Where this method of growing Violets can be carried out I can heartily recommend it, for not only is labour saved in lifting and replanting, but the quality of the

blooms and the length and strength of the stems are all that could be desired. In this system it is absolutely essential that the plants should be grown on a site with a southern exposure, for while it is quite possible for Violets to get too much sun in summer, it is quite impossible for them to have too much in winter. Violets should not be grown on the same piece of ground in two consecutive years. If, however, change cannot be arranged, there should be a complete change of stock, or they will quickly deteriorate.

Preparation of the Soil.—Violets require good cultivation, and well repay liberal treatment. The soil should be double-dug, *i.e.* two spades deep, and a liberal supply of well-rotted manure incorporated as the work proceeds. There may well be two layers of this manure, one over the loosened subsoil, and another between the turned over topsoil and the "crumbs." This soil preparation should be carried out during the winter months, the earlier the better, so that the soil will have settled somewhat before planting begins. Where the soil is light the manure used should be of a retentive nature, and there should be plenty of it. In clay soils stable manure should be used, and any other material that will reduce its adhesiveness. For this class of soil an application of lime to the surface, when the digging is completed, will be found beneficial. During March a dry, calm day should be selected and the plot given a thorough dressing of old soot at the rate of half a bushel to the square rod, lightly forked into the surface soil. This soil preparation is of the utmost importance, for no subsequent treatment or feeding will rectify initial errors.

Propagation.—The best way to raise the stock of young plants is by inserting cuttings of runners from selected plants during August or early in September. Any cold frame will do, so long as it has a southern exposure. It should be well provided with drainage, and the soil, which should be rich and sandy, should be brought up to within 6 inches of the glass. The cuttings should be inserted about 3 inches apart each way, well watered in, and kept shaded till rooted. They should then have ventilation on all favourable occasions, and during mild weather the lights may be removed during the day in order to induce the growth of stocky, well-developed plants. The next best method of increase is to grow a sufficient number of plants out of doors, in some sunny, sheltered position, and to lift and divide the plants during April. Each stock plant may be divided into four or six pieces, the side-growths, which are usually furnished with small, fibrous roots, being used and the old plant discarded. Should this method of increase be adopted, the early production of roots by these side-growths will be facilitated if the soil is loosened immediately about the plants, and some leaf-soil incorporated with it and kept moist. Such young plants are generally well hardened-off, and receive but little check when transferred to their new quarters. Those from plants given frame protection are softer and, unless the weather is very favourable, take rather unkindly to the altered conditions. If, however, a sufficient number of outdoor stock plants cannot be obtained, then those from

the cold frames should be used. The rooted side-growths should be carefully removed from the parent plants early in March and planted in a separate frame, where, by being kept close and given shade for a few days, they speedily become established. These young plants should be set out at about 6 inches apart each way, and once they have got over the check of separation they should be given abundance of air, so that they may be induced to grow sturdily and strong enough to bear removal to their summer quarters by the second week in April.

The foregoing remarks apply chiefly to the propagation of the single-flowered varieties, and while it would be incorrect to say that the double-flowered kinds will not stand our winters out of doors, they are certainly less hardy, and, except in the most favoured localities, they are best when they can be given some protection during the winter months. This being so, the young stock, therefore, must be increased by cuttings inserted in the autumn, or by removing sufficient rooted side-growths from the old plants in March, and planting them in a separate frame before putting them in their summer quarters towards the end of April.

Summer Quarters.—Planting may be carried out in April, sooner or later according to the state of the soil and the weather, and the hardiness of the plants. This last condition is important, as I have seen very serious damage caused by a few degrees of frost, where the plants were insufficiently hardened off prior to planting. The soil should be forked over and well pulverized until it presents a level, finely disintegrated condition. Afterwards tread or roll it to obtain the necessary firmness.

The single-flowered kinds, such as 'Princess of Wales,' should be given ample room for development, and 15 inches each way will not be too much, while 10 inches to 12 inches each way will suit most of the double varieties. There is a remarkable difference in the habit of growth between the single- and the double-flowered varieties. The former is generally a loose-growing plant, with large leaves and long foot-stalks, while the double varieties are dwarf and compact in growth, the leaves being small and much more numerous. The hole for the plant should be large enough to take the ball of soil and roots, and be well loosened in the bottom. On this place the plant, surrounding it with finely broken soil, and at such a depth that the crown of the plant is not buried, nor the neck of the plant exposed. Make the soil very firm by pressing it with the fingers, and water the plants thoroughly unless rain is expected.

The after-cultivation consists of spraying the plants every evening till they are established. Every endeavour should be made to keep the plants growing, and in perfect health. The plants should be examined at weekly intervals, as under normal conditions they will produce numerous stolons or runners, which, if allowed to remain, are a drain on the plants and prevent their proper development. These stolons should be removed carefully with the aid of a knife, any undue disturbance of the plants being avoided. There seems to be a

diversity of opinion, however, as to how this work should be carried out. One grower says the stolons should be cut out, one leaf being left ; another says they should be pulled out with a jerk, to prevent the crown from becoming too thick ; while a third says, slip the hand under the runner and press downwards with the thumb so as to sever it at its junction with the parent plant. Whichever method is adopted, leaving several scar-like wounds on the stem of the plant should be avoided if possible. The Violet, too, produces numerous cleistogamous seed pods, from self-fertilized inconspicuous flowers, close to the soil. These pods should be removed when seen, as they are certain to be a great drain on the plants. Mulching with very short, well-rotted manure, leaf mould, or lawn mowings will be found beneficial upon soils that part readily with moisture, but this is seldom required on the more retentive soils, equally good results being obtained by the frequent use of the Dutch hoe, or the " Caxton " cultivator to maintain a loose surface soil. Watering must be closely attended to during periods of drought, and the application of weak liquid manure or soot water will be found of great benefit to the plants. When the weather is hot and dry, however, the plants should be sprayed, rather forcibly, with clear water during the evenings, to prevent the establishment of Red Spider on the plants, and the soil should be frequently stirred to prevent the escape of moisture. If the plants are occasionally dusted with old soot, particularly on the under surface of the leaves, this also will help to repress the pest mentioned. I have found, however, that where the soil about the plants is occasionally mulched with lawn mowings, Red Spider causes but very little damage to the plants.

Winter Quarters.—Although Violets can be successfully and profitably grown in the open throughout the winter months, yet, with the extra shelter and warmth of a frame, stronger-stalked, cleaner, and larger blooms can be obtained over a much longer period. Violets may be lifted and placed in frames throughout September and early in October. The first half of September is an ideal time, for by planting then the plants become established in their winter quarters before it becomes necessary to place the lights in position.

If Violet blooms are desired throughout the winter, the best place to grow them is in a brick-pit facing south where the plants can obtain the maximum of sunlight, and where just sufficient pipe heat can be maintained to keep out frost. This will obviate the necessity of mat protection, which obscures light. To be successful the plants must have perfect drainage, so where there is sufficient depth the drainage material may consist of old pea-sticks, hedge prunings, or other loose material. Over this should be placed some long strawy manure, and then some well-decayed material, the whole being made very firm. Prepared soil to the depth of about a foot should now be placed in the frame for the plants, and may consist of equal parts of loam and leaf-soil, to which has been added some bone meal and soot. This soil should be made very firm to prevent excessive subsidence, and at such a level that the leaves of the plants, when planted, almost touch the glass.

There should be a slight slope up to the back of the frame to enable the plants to obtain all the light possible. The best plants only should be planted, and they should be lifted carefully and with good balls of soil attached to the roots, so that no undue check is caused by removal to their winter quarters. On some of the stiff, clay soils it may be necessary to cut with a spade round about the plants ten days or so before lifting, as in such soils the roots are usually very long and less fibrous than on the lighter loams. On no account should the plants be lifted in very bright weather or when the soil is dry. The obvious thing to do in the latter circumstance is to apply water copiously to the plants on the previous evening. The single-flowered varieties should be set out at 15 inches apart each way, 10 inches being ample for the double sorts. They should be thoroughly watered in and kept shaded till they have recovered from the check of removal. Violets must have abundance of fresh air, day and night when the weather is favourable, as there is nothing that will bring on disease sooner than soft-grown foliage.

The after-routine consists of strict attention to watering, ventilation—which should always be ample except during severe frost or dense fog—the frequent stirring of the soil, the removal of broken or decaying foliage as soon as seen, and protection by means of garden mats when that becomes necessary.

Violet plants may be lifted from their summer quarters and placed in cold frames, and treated much in the same way as described above. But, all things considered, I should much prefer to arrange their summer quarters in such a way that frames could be placed over them in October, thus obviating the necessity for any further disturbance. Flowers of exceptional size and quality can be obtained in this way during October and November, and again from February onwards.

Double Violets succeed well when grown in pots, provided they are not unduly coddled or given much fire heat. Pots 6 inches or 7 inches in diameter should be prepared, and the plants placed in them towards the end of September. They should then be placed in a cold frame and kept shaded till the roots have become established. Watering and any overhead moistening should be carried out with great care, as the foliage and blooms are so liable to damp and decay. Small numbers can be taken, at fortnightly intervals, to a greenhouse with a temperature of not more than 45° F., and these will flower continuously from November onwards. Three of the best varieties to grow for this purpose are the old 'Neapolitan,' 'Lady Hume Campbell,' and 'Mrs. Arthur.' The last is a much stronger grower than 'Marie Louise,' and throws its blooms, which are borne on thick stems, well above the foliage. It is also richer in colour than that variety, due to a mingling of mauve in the blue petals. 'Marie Louise,' 'Mrs. J. J. Astor,' and 'Coolcronan Hybrid' are also good, but rather liable to "damp" unless the atmosphere is kept fairly dry. Pot-grown Violets are most useful for the decoration of the conservatory, for even a dozen pot plants in bloom will fill the air with a delicious perfume.

Varieties.—The most popular single-flowered variety is, undoubtedly, 'Princess of Wales.' It bears large, dark blue blooms on stiff stems sometimes 9 inches or more in length. 'Mrs. Lloyd George' is another popular and prolific variety. It has a large dark violet bloom, with a rosette of lighter petals in the centre, which is most attractive. Market growers are planting quantities of a variety called 'Askania,' which bears large, dark purple flowers with great freedom, and which are very fragrant. 'Baroness de Rothschild' is another free-flowering variety, purple, and of great substance. 'Admiral Avelland' has reddish-purple flowers also of great substance, and is a great favourite with some. 'Cœur d'Alsace' has deep rose-coloured blossoms which are borne in great profusion from October onwards. This variety is well adapted for naturalizing. The variety 'Tina Whitaker' is comparatively new, and while I have not had the pleasure of growing it I am assured by friends in Devon that it must be ranked as one of the best. The flowers are described as "pure amethyst," and they are of large size, very fragrant, and among the easiest to bunch. It flowers well under glass, and lasts a long time in a cut state.

Among the double-flowered varieties 'Marie Louise' still holds pride of place, though 'Mrs. Arthur' is preferred by some growers. The former bears large, deep blue-purple flowers with a splash of red in the petals. 'Mrs. Arthur' is dark blue with a touch of white in the centre. The flower stems are strong, holding the flowers quite erect. 'Princess Mary' may be described as a double 'Princess of Wales,' and is particularly good. 'Mrs. J. J. Astor' has flowers of a lovely shade of rosy heliotrope, which are produced with the greatest freedom. 'Lady Hume Campbell' is mauve, compact in growth, and very free. 'Comte de Brazza' is the best double white.

At what stage the flowers should be picked must be left to the good judgment of the grower, but, speaking in general terms, the doubles are best gathered when the outer petals have turned back flat, and the singles when they are actually open and not before. This reasoning may appear ambiguous, but the blooms do not open readily when picked in the bud stage, and one fresh, fully-opened bloom is worth more than half a dozen buds. The blooms should be picked with good long stalks, graded and tied rather low, so that the bunch assumes a loose, natural appearance, showing the beauty of each bloom to the best advantage. Each bunch should be supported by a few clean Violet leaves, which are the most fitting setting for the rich purple flowers.

I should prefer to close this account of the Violet here and now without reference to any pest or ailment which may attack this sweetly scented harbinger of spring; but, in fairness to anyone about to take up Violet growing for the first time, I should point out that the Violet is, like other flowering plants, liable to illness and disease. No one should, primarily on that account, be deterred from growing Violets. The grower, however, should be able to recognize quickly the first

symptoms of attack, and to deal with it promptly ; so, if for no other reason, I shall describe what I consider to be three or four of the most pernicious.

PESTS AND DISEASES OF THE VIOLET.

American Spot Disease (Alternaria violae).—This is, undoubtedly, one of the most destructive maladies known to attack the Violet. It may attack the plants at any time or stage in their growth, but more particularly during the autumn months. Plants which have made soft, fleshy growth are most subject to the disease. The first symptoms of an attack are a number of small circular, yellowish-white spots on the leaves. These spots increase in size until they occupy the whole surface area, and there is a complete collapse of both leaf and stalk. This disease spreads with alarming rapidity, and if not checked at once it may cause very serious loss of foliage.

No effective remedy for this disease has been found when once it has gained a foothold in the frames. The usual sprayings and dustings of a fungicidal nature have produced little effect. Immediately the first diseased leaf is detected it should be promptly removed and burnt, and the plants, especially those in the vicinity, should be dusted with flowers of sulphur. More ventilation should be afforded, and a drier atmosphere maintained. This disease is most severe in a year which has been sunless and rainy, or if the plants have been grown in a position unduly shaded. Grow the plants, therefore, where they may get plenty of light. They should be well spaced out, so that they may be induced to make vigorous, firm, well-matured growth, and protected from conditions likely to induce disease. The plants should be lightly dusted with flowers of sulphur at fortnightly intervals throughout late summer and autumn, and all decaying leaves and rubbish about the plants removed. If these preventive measures are not taken before the plants are placed in the frames it will be found almost impossible to save them afterwards if attacked.

Violet Smut.—Possibly the next most destructive disease after "Spot" is Violet Smut, or *Urocystis violae*. The leaf-stalks become swollen and blistered, and the whole plant presents a distorted appearance. These swollen portions eventually burst, exposing sooty-black masses of spores, which are developed within the tissues of the plant. The remedial measures to be adopted are to remove all contorted stems and blistered leaves, taking care to do this before they have shed their spores, and to spray the plants with weak Bordeaux mixture at intervals of three or four days. By persistence in this direction the disease may be overcome.

Where these diseases occur it is expense well justified to invest in fresh stock frequently, if not annually, and to change the summer quarters of the plants. Lime or chalk in some form should be applied to the surface of the soil once the digging is completed in spring.

Red Spider (Tetranychus telarius).—These mites are most troublesome to Violets, especially on soils which are inclined to become dry

and hot during the summer months. They may be present on the plants at all seasons of the year, and are most difficult to eradicate. Where the soil can be kept in a moist, cool condition by mulching this pest can be kept under control. This mulching may consist of such material as leaf mould, spent hops, or lawn mowings. The plants and soil should be frequently dusted with old soot throughout the growing season, and spraying with lime sulphur at 1 per cent. has given good results, but it must be applied to the plants during dull weather, or when the sun has declined, as it may cause slight injury to the foliage. Spraying the plants rather forcibly with clear water in the evenings is to be recommended. If the soil about the plants be mulched with some short, well-rotted manure it will prevent them from becoming covered with grit during the operation.

Midges.—Two midges, *Dasyneura affinis* and *Dasyneura violae*, attack Violets throughout the British Isles, while a third, *Phytophaga violicola*, not found here, occurs in the United States of America, and is there a very serious enemy to the Violet-growing industry.

Dasyneura affinis.—This midge is widely distributed throughout Europe and the British Isles. The larvæ, which at first are whitish, afterwards turning pale orange, cause folding and distortion of the young leaves and flowers. The leaves at the tips of the stalks especially are affected, being turned into a compact mass of leaves with the stipules slightly thickened, and the edges of the leaves rolled upwards and often tinged with blue. The larvæ are gregarious, and pupate in white silken cocoons in the rolls of the leaves. They can generally be found towards the end of June, and again about the end of August, the last brood spending the winter in the pupal stage.

As a control measure, turning over the soil and dusting the plants with slaked lime and other powdery substances, such as fresh pyrethrum, has been suggested. Hydrocyanic acid gas and naphthalene have also been suggested.

Dasyneura violae.—This midge is widely distributed in Europe. In Great Britain it is recorded from Durham and Cumberland. The larvæ, which are yellow to pale orange and gregarious, attack wild and cultivated Violets. They cause the dwarfing of the whole plant, resulting in the formation of a rosette, the leaves being abnormally pilose. The larvæ work at the base of the short sessile leaves, and they may be found in July, August, and September. Pupation occurs in white cocoons on the plant, and the adult midges may be found in the following June.

The control measures suggested are the digging up and destruction by fire of any plants found attacked by this pest, along with measures recommended for *Dasyneura affinis*.

Aphis.—Mr. STANILAND, Long Ashton Research Station, reports serious damage to Violets, chiefly 'Princess of Wales,' by a new species of aphid, new to Europe and probably undescribed. It appears to belong to the genus *Phorodon*. Winged forms were observed in January of this year in the Dawlish area, and about six acres are known to be affected. The mild spell about Christmas appeared to

cause a sudden increase in the numbers, and the extent of damage was very considerable. One grower estimates his loss through this pest at £200, and another at about £130, so that the pest may be regarded as serious.

The leaves of affected plants are much curled, making spraying or dusting difficult. The plants become stunted and flattened, and bear a remarkable resemblance to " Small Leaf " in strawberries ; there is a great increase in the number of crowns, the excess crowns being weak and producing very little new root. The flowers are also affected, and are valueless owing to light patches occurring in the petals, which are also distorted. Two-year-old plants are more seriously affected than are those a year old ; the runners also being affected. No definite information is yet available as to how this pest reached the area mentioned.

Dusting and spraying are being tried, also dipping the runners in a pyrethrum wash, in an attempt to obtain uninfested material for planting.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXV.—POLLINATION IN ORCHARDS (VIII).

Insect Visitors to Fruit Blossom.

By G. FOX WILSON, N.D.H., F.L.S., F.E.S.

THE study of the species of insects effecting the pollination of hardy fruit flowers and their habits while at the flower was commenced in 1920.* Most of the observations have been carried out in the fruit plantations of the Royal Horticultural Society's Gardens at Wisley.

The present account is devoted to details of the insects concerned, and notes on their habits when visiting the flowers.

The numbers of species of insects which visit the blossoms of our hardy fruits are not all-important, for effective pollination depends on the numbers of visits paid by an industrious species. The important factor is the number of visits by an individual and not the promiscuous visits of different individuals. For instance, our records show that "fungus gnats" (*Sciara sp.*) far outnumber all other insects at the flowers of tree fruits. These insects, however, cannot be classed among the more useful pollinating agents, for, although the amount of pollen distributed by them must be considerable, their work is spasmodic. They flit from flower to flower on the same tree, and are not inclined to any great extent to move from one tree to another.

CLEMENTS and LONG † have reviewed the published work on normal and experimental flower pollination so far as insects are concerned. The researches of VON FRISCH, PLATEAU, and others are considered in the light of modern research, and their exhaustive summary of the subject should receive the attention of all workers who study the relation between flowers and insect pollinators.

LUTZ ‡ has studied the attraction to insects of various colours in flowers, and their probable sensitiveness to ultra-violet light. His opinion is that ultra-violet rays are as important as any others in the discussion of the relation between floral colours and insects.

HOOPER § has given general notes on the visits of insects to fruit flowers in this country.

* G. FOX WILSON, *Journ. R.H.S.* 1926, **51**, pp. 225-251, and *Annals Applied Biology*, 1929, **16**, pp. 602-629.

† *Experimental Pollination: An Outline of the Ecology of Flowers and Insects*. Carnegie Instit., Washington, 1923, 274 pp.

‡ *Annals New York Acad. Sciences*, 1924, **29**, pp. 271-283.

§ *Journ. S.-E. Agric. College, Wye*, 1931, No. 28, pp. 211-215; *Journ. Royal Soc. Arts*, 1929, vol. lxxvii. No. 3981, pp. 424-438; *The Bee World*, March and April 1931, pp. 27-28, 37-38.

CROSS-POLLINATION.

Insects visit a flower to obtain pollen and/or nectar. They can be depended upon to bring about cross-pollination only if they confine their visits on any one journey (hive bees) or period of time (wild bees) to flowers of closely similar structure. This habit of constancy we find amongst the more highly developed insects—for instance, the bees. The hive bee is the most constant insect visiting fruit blossom, while humble bees (*Bombus* sp.) and wild bees (*Andrena* sp.) are indefatigable workers also, but are somewhat less constant.

Drone flies (*Eristalis* sp.) and Hover flies (*Syrphus* sp.) are among the most useful dipterous insects that visit fruit blossom, though their habits are somewhat erratic and laboured.

Such insects as *Volucella* sp., the Narcissus fly (*Merodon equestris*), flesh flies (*Sarcophaga* sp.), and some other flies are inconstant and casual in their habits, so that they can be depended upon but little to carry pollen from flower to flower of the same kind.

Ants, earwigs, thrips, and the Raspberry beetle (LEES *) frequently feed on the nectar of fruit flowers but, together with the Apple blossom weevil and the larvæ of the winter moth (*Cheimatobia brumata*) and the green pug moth (*Eupithecia rectangulata*), they feed also on the floral organs and are unwanted visitors to fruit blossom.

Certain flower-visiting beetles, e.g. ladybirds (*Coccinella* sp.) and blossom beetles (*Meligethes* sp.),† do not carry pollen far, as they restrict their attention to a few flowers on a branch or a spur, and but few pollen grains adhere to their smooth bodies.

Collection of Data.—The most comprehensive survey of insect visitors to fruit blossom in a given time and area requires the services of several observers making observations at the same time on different species of fruit flowers which are growing in an area where such flowers are subjected to similar conditions of altitude, soil, climatic conditions, and cultivation. A partially complete record is obtainable where one observer is concerned and where the number of insects visiting a limited number of flowers, such as a blossom truss, can be noted. Records as to the numbers of insects which visit a comparatively small number of flowers provide data only as to the relative attractiveness of various fruit flowers at the particular time and in the particular area where the observations were made. If, for instance, we confine our attention to a single flower we find that it is visited to an extremely small degree, and may even escape being pollinated altogether. The presence of a large number of pollinating insects on a fruit tree in full blossom provides no indication as to the attention received by the individual blossom. Our own observations show that 45 different species of insects visit Pear blossom at times and, in a given unit of time (20 minutes), 76 individual insects were counted on a small Pear tree 6 feet high (May 9, 1922, 12.10–12.30 P.M.), yet one individual flower kept under special observation was found to be visited during that time by only one Anthomyid fly.

* *Ann. Rept. Agric. and Hort. Research Stat., Long Ashton*, 1917, pp. 35–36.

† F. V. THEOBALD, *Journ. S.-E. Agric. College, Wye*, 1906, No. 15, pp. 88–90.

A census which will indicate the comparative numbers of different pollinating agents must of necessity be taken over a period of years. Insufficient data are provided when limited observations are made in the same fruit plantation, as no account is then taken of certain factors, more especially the effect of adverse climatic conditions. The visits paid to fruit blossom by bees, particularly certain wild bees (*Andrena* sp.), are dependent on weather conditions, for such insects never venture far from their homes unless the sun is bright.

Our records show that the visits of pollinating agents of the flowers of fruits belonging to the Order Rosaceae may be put in the following order :

Hymenoptera.

1. Hive bees (when hives are present in the vicinity of the fruit plantation).
2. Wild bees (*Andrena* sp.).
3. Humble bees (*Bombus* sp.).

Wild and humble bees in most highly cultivated districts are, however, in insufficient numbers to effect complete pollination in large plantations of fruit.

Diptera.

1. Fungus gnats (*Sciara* sp.).
2. Fever flies (*Dilophus* and *Bibio* sp.).
3. Anthomyid flies.
4. Hover flies (*Syrphus* sp.).
5. Drone flies (*Eristalis* sp.).
6. Muscid flies, more especially *Musca autumnalis* (corvina).
7. Bluebottle fly (*Calliphora erythrocephala*).

The following table gives some indication of the numbers of the more important pollinating agents of hardy fruit flowers (12 Rosaceae

TABLE I.

	APPL. 14 v. 1922, 14.50-15.20.	PEAR. 9 v. 1922, 12.10-12.40.	QUINCE. 20 v. 1922, 11.25-11.55.	MEDLAR. 5 vi. 1930, 11.50-12.20.	CHERRY. 9 v. 1922, 11-11.30.	ALMOND. 26 iii. 1930, 11.15-11.45.	APRICOT. 11 iv. 1930, 15.5-15.35.	PEACH. 10 iv. 1930, 11.45-12.15.
Actual number of flowers used in counts . .	25	25	25	25	25	25	25	25
<i>Pollinator :</i>								
Hive bees . .	13	11	5	5	3	9	17	2
Humble bees . .	22	3	8	3	4	5	1	1
Wild bees . .	9	13	3	7	4	1	0	2
Hover flies . .	4	16	5	9	2	2	1	2
Bluebottles . .	6	2	2	0	1	1	1	1
Muscids and Anthomyids . .	2	9	0	2	1	5	1	2
Beetles . .	1	7	3	4	0	0	0	0
* Actual number of insect visitors .	64	67	28	32	18	26	22	12

* Exclusive of *Sciara* sp.

TABLE I—*continued*.

	PLUM. 9 v. 1922, 11.40-11.10.	LOGANBERRY. 13 vi. 1923, 16.00-16.30.	RASPBERRY. 6 vi. 1923, 12.00-12.30.	STRAWBERRY. 6 v. 1923, 11.30-12.00.	BLACK CURRANT. 17 iv. 1923, 11.35-11.35	RED CURRANT. 17 iv. 1923, 11.35-12.5.	GOOSEBERRY. 18 iv. 1923, 12.30-13.00.
Actual number of flowers used in counts . . .	25	25	25	10	10	10	10
<i>Pollinator :</i>							
Hive bees	4	7	7	1	0	0	0
Humble bees	5	3	14	3	4	2	4
Wild bees	3	5	1	2	0	1	5
Hover flies	10	4	1	2	1	2	1
Bluebottles	1	0	0	1	0	0	0
Muscids and Anthomyids	5	1	1	1	1	5	1
Beetles	2	1	1	0	0	0	0
*Actual number of insect visitors	34	22	28	14	7	12	13

and 3 Saxifragaceae). The time over which observations were made in any one year between 1920 and 1925 varied from 20 minutes to 12 hours 40 minutes, but our figures are based on 30-minute observations taken on days when the climatic conditions were particularly favourable to the visits of insects, and on plants in full blossom when pollinating insects, both individually and specifically, were particularly abundant. Visits made by fungus gnats (*Sciara* *sp.*) have been entirely ignored, as these insects surpass in numbers all other visitors to fruit blossom. Visits made by Anthomyid and Muscid flies—species of the former not having been determined—are grouped together on account of their similar habits while at the flower.

It is probable that in this table one insect visitor may have been counted as two or even three individuals, for it was not found possible, when making counts of the visitors to 25 blossoms, to mark each individual. The marking of insect visitors was carried out only when counts were made on a smaller number of flowers.

FACTORS AFFECTING THE NUMBER OF POLLINATING AGENTS IN FRUIT PLANTATIONS.

I. The more important factors within the grower's control which tend to affect the number of pollinators are :

The Site of the Plantation.—The numbers of humble and other wild bees found visiting the blossoms of our hardy fruits will depend on the close proximity of the orchard to open country—meadows, heaths, woods, etc. Most of the more diligent and useful pollinating agents

* Exclusive of *Sciara* *sp.*

are true sun-loving insects, and their activities are lessened if the plantation is shaded from direct sunlight. The hours during which direct sunlight is available are reduced when fruit plantations are surrounded by woods, high hedges, and rising ground. Again, pollinating insects are as a general rule repelled by high winds and gales, so that exposed plantations receive fewer visits than sheltered ones—the presence of a shelter belt will render the conditions more favourable to the visits of pollen-carrying agents. A plantation situated in a low-lying district is more subject to frosts and low night temperatures than one placed on a hillside. Apart from the injurious effect that low temperatures have on the essential parts of the flower (stigma and stamens), a danger exists whereby the number of ground-building pollinating agents are reduced accordingly.

The Method of Planting.—That there is a certain amount of competition between the flowers of hardy fruits in the case of those whose blossoming periods overlap has been observed by us. Humble bees have been observed to neglect the flowers of Currants and Gooseberry where these fruits were growing in close proximity to Cherries. The blossoms of the latter proved to be more attractive than the less conspicuous flowers of the former. Such competition between fruit blossoms would in a normal year be negligible but, during adverse climatic conditions when few insects other than humble bees are present in the plantation, the effect might be serious.

The Presence of Hives of Bees.—The judicious placing of hives in fruit plantations is necessary to ensure the presence of hive bees in sufficient numbers to carry out the work of pollination in large orchards and fruit plantations, where it is rarely possible to depend on the work of wild insects. Their presence in all fruit plantations, especially where large areas are devoted to one kind of fruit, makes cross-pollination doubly sure. It is necessary to provide strong colonies obtained from a healthy stock, and to allow one hive for an acre of fruit.

II. The more important factors outside the grower's control are :

Climatic Conditions.—A wet and cold season is disastrous to all the more useful pollinating agents of hardy fruits. Adverse weather conditions reduce flight, and a long series of observations carried out at Wisley show that bees, more especially hive bees, are affected by low temperatures, even when accompanied by bright sunshine. Humble bees, on the other hand, are not unduly deterred by inclement weather, while wild bees (*Andrena* sp.) are active when the temperature is low provided the sun is bright. The visits of pollinating agents are reduced or cease altogether during heavy rain and sleet showers, high winds, cold northerly and easterly winds, a saturated atmosphere, and clouded skies.

The Flower, Conspicuousness and Attractiveness.—As regards the floral envelope, *Colour* is a fixed factor and is not unduly influenced

to any extent other than by the degree of illumination. DARWIN has stated * that "Humble and hive bees are good botanists, for they know that varieties may differ widely in the colour of their flowers and yet belong to the same species." We have found, however, that varieties of Apples bearing pink blossoms are less favoured by bees—more especially humble and other wild species and, to some degree, by the hive bee—than are those varieties which bear white blossoms. Flowers which fade quickly and those in which the maximum nectar flow is of short duration reduce their chance of pollination. We have also found that humble bees have a tendency to visit the older rather than the freshly open blossoms, even when the petals are turning brown. The quantity of viable pollen in the older flowers is reduced. *Odour* is an unstable factor, on account of its varying intensity and by reason of it being affected by the age of the flower. The presence of air currents as well as the degree of humidity prevailing are factors which affect the conveyance of odour over a given area.

Accessibility to the *nectaries* and the amount of *nectar* present are factors which govern the number of available pollinators.

The quantity of *pollen* available is also important to those insects which are primarily pollen feeders (*e.g.* drone flies), and to others, more especially hive bees, which may be engaged on a particular journey with the sole purpose of collecting pollen.

III. The less important factors outside the grower's control which tend to affect the number of available pollinators are :

The Interrelation between the Blossoming of Fruit Trees and the Flight Period of Insects.—The number of wild bees (*Andrena sp.*) will be reduced considerably when the flowering period of fruit trees does not coincide with the flight period of these insects.

Sex Ratio.—The females of humble bees (*Bombus sp.*) and wild bees (*Andrena sp.*) fly longer and visit more flowers than the males of the same species. With some other wild bees (*Nomada sp.*), however, the visits paid to fruit blossom by the males far outnumber those paid by the females (PERKINS †). These insects have parasitic habits, and the females are engaged principally in seeking nests of *Andrena sp.* in which to deposit their eggs.

FACTORS INFLUENCING FRUITFULNESS IN ORCHARDS.

There are many factors, other than a lack of pollen-carrying agents, which influence fruitfulness in orchards. Such factors, however, have no direct bearing on the subject of the present communication, so that they will not be considered, but more attention has in the past been paid to them than to ensuring the presence of pollinators in sufficient numbers.

* *Cross and Self Fertilization of Plants*, 1891, third edition, p. 419.

† *Trans. Entom. Soc., London*, 1919, Pts. I and II, pp. 218–264.

TABLE II.

*Number of different species of Insects taken on Fruit Flowers
at Wisley, 1920-30.*

	Hymenoptera.					Diptera.			Coleoptera.		Hemiptera.					
	Apidae.	Bombidae.	Megachilidae.	Andrenidae.	Others.	Syrphidae.	Muscidae.	Others.	Beetles.	Weevils.	Lepidoptera.	Neuroptera.	Heteroptera.	Homoptera.	Thysanoptera.	Dermoptera.
Apple . . .	2	5	1	9	8	14	6	18	17	4	5	2	1	2	1	—
Pear . . .	2	3	1	6	4	6	5	6	8	3	—	—	—	—	1	—
Quince . . .	2	4	—	3	1	2	2	2	4	3	1	—	—	—	—	—
Medlar . . .	1	3	—	6	—	7	1	6	4	—	—	—	—	—	—	—
Cherry . . .	2	5	1	4	2	6	2	4	2	1	1	—	—	—	—	—
Almond . . .	1	4	—	1	—	2	4	3	—	—	—	—	—	—	—	—
Apricot . . .	1	1	—	1	—	—	1	—	—	—	1	—	—	—	—	—
Peach and Nectarine . . .	1	2	—	1	1	1	2	—	—	—	—	—	—	—	—	—
Plum . . .	2	3	1	8	3	7	3	4	5	—	2	—	—	1	—	1
Blackberry . . .	2	5	—	4	1	9	1	4	3	—	2	—	—	—	—	1
Loganberry . . .	2	4	—	4	1	11	1	2	4	—	—	—	1	—	—	—
Raspberry . . .	2	7	—	9	1	7	—	2	3	—	2	—	1	1	—	—
Strawberry . . .	2	3	—	4	1	4	1	4	2	—	1	—	—	—	1	—
Black Currant . . .	2	5	—	2	3	2	1	4	1	1	1	—	—	—	—	—
Red and White Currants . . .	2	3	1	5	5	4	1	7	7	—	1	—	1	1	—	—
Gooseberry . . .	2	4	1	4	5	3	1	3	4	—	1	—	—	1	—	—
Chestnut . . .	1	—	—	2	2	6	4	8	3	—	—	—	1	—	—	—
Nuts, Cob and Filbert . . .	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Walnut . . .	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

COMPLETE LIST OF INSECT SPECIES CONCERNED IN THE POLLINATION OF HARDY FRUIT FLOWERS AT WISLEY, 1920-30.

The following insect species were taken at the flowers of sixteen entomophilous and three anemophilous flowers in the fruit plantations of the R.H.S. Gardens at Wisley, 1920-30.

Two species of hive bees—viz. the common honey bee (*Apis mellifica*) and the Ligurian bee (*A. ligustica* Spin.), together with hybrids between the two species—have been taken on nearly all fruit flowers.

The several species of "fungus gnats" and Anthomyid flies concerned in the pollination of fruit blossom have not been identified, so they are classed in the following list under the general terms "*Sciara* sp." and "Anthomyids" respectively.

A comparatively small number of spiders, belonging to three families, have been taken in fruit blossom, but, as they do not add materially to the work of pollination, they have been omitted.

No attempt has been made to arrange the Orders, Families, and Genera of either the plants or the insects in strict genealogical sequence. The families of insects are arranged in accordance with the importance

of their members as pollinating agents. The species in heavy type indicate the more useful pollinating agents of hardy fruit flowers.

MÜLLER * and KNUTH † give lists of insects visiting the flowers of fourteen and nine different species of fruit flowers respectively. LAIDLAW ‡ and WALTON § list the numbers of *Bombus* *sp.* found visiting fruit blossom in Scotland and in North Wales respectively. HATTON || records the insects taken on Black Currant flowers at East Malling.

Explanation of abbreviations :

- c. p.* = collecting pollen.
cr. = crawling over blossom.
d. f. o. = devouring floral organs.
f. p. = feeding on pollen.
l. n. = licking nectar.
p. a. = predaceous on aphides in flowers.
o. = ovipositing in blossom.
s. = sucking nectar.

HYMENOPTERA.

Hive Bees.

- Apis mellifica** L. ♀ . . . (s. and *c. p.*) Apple, Pear, Medlar, Blackberry, Loganberry, Raspberry, Strawberry, Red Currant.
 (s.) Quince, Cherry, Almond, Apricot, Peach, Plum, Black Currant, Gooseberry.
 (*c. p.*) Chestnut, Cob and Filbert Nuts, Walnut.

Humble Bees.

- Bombus agrorum** F. ♀ . . . (s. and *c. p.*) Apple.
 (s.) Quince, Medlar, Cherry, Gooseberry.
B. agrorum F. ♀ . . . (s.) Cherry.
B. helveranus Seidl. ♀ and ♀ (s. and *c. p.*) Loganberry, Raspberry.
B. hortorum L. ♀ . . . (s. and *c. p.*) Almond.
B. jonellus K. ♀ . . . (s.) Raspberry.
B. lapidarius L. ♀ . . . (s. and *c. p.*) Cherry, Raspberry.
 (s.) Apple, Quince, Peach, Plum, Blackberry, Strawberry, Black Currant, Red Currant.
B. lapidarius L. ♀ . . . (s. and *c. p.*) Quince, Raspberry.
 (s.) Medlar, Plum, Red Currant.
B. lucorum L. ♀ . . . (s. and *c. p.*) Quince, Cherry, Blackberry, Loganberry, Raspberry.
 (s.) Apple, Pear, Almond, Apricot, Plum, Black Currant, Red Currant, Gooseberry.
B. lucorum L. ♀ . . . (s. and *c. p.*) Quince, Cherry, Blackberry, Loganberry, Raspberry.
 (s.) Apple, Medlar, Plum, Strawberry, Black Currant, Red Currant, Gooseberry.
B. muscorum F. ♀ . . . (s.) Raspberry.
B. pratorum L. ♀ . . . (s. and *c. p.*) Apple, Quince, Cherry, Blackberry, Loganberry, Raspberry.
 (s.) Almond, Black Currant, Gooseberry.

* *The Fertilisation of Flowers*, 1883.

† *Handbook of Flower Pollination*, 1906, 3 vols.

‡ *Scottish Naturalist*, 1930, pp. 121-5.

§ *Annals Applied Biology*, 1927, 14, pp. 465-9.

|| *Jour. Pomology*, 1921, vol. ii. pp. 160-198.

- B. pratorum** L. ♀ . . . (s. and c. *p.*) Apple, Blackberry, Loganberry, Raspberry.
 (s.) Pear, Strawberry.
B. ruderatus F. ♀ and ♀ . . . (s.) Black Currant.
B. terrestris L. ♀ . . . (s. and c. *p.*) Raspberry.
 (s.) Apple, Pear, Cherry, Almond, Peach, Plum, Black Currant, Red Currant, Gooseberry.
B. terrestris L. ♀ . . . (s. and c. *p.*) Blackberry, Raspberry.
 (s.) Apple.

Cuckoo Bees.

- Psithyrus quadricolor* Lep. ♀ . . . (s.) Blackberry, Loganberry.
Sphecodes gibbus L. ♀ . . . (c. *p.*) Apple.
 (s.) Cherry, Plum.

Carpenter and Mason Bees.

- Osmia rufa** L. ♂ . . . (s.) Apple.
O. rufa L. ♀ . . . (s. and c. *p.*) Pear.
 (s.) Apple, Cherry, Plum, Red Currant, Gooseberry.

Wild Bees.

- Andrena afzeliella** K. ♀ . . . (c. *p.*) Medlar.
A. albicans Müll. ♂ . . . (s.) Apple, Pear, Medlar, Plum, Blackberry, Loganberry, Black Currant, Red Currant (also *f. p.*), Gooseberry.
A. albicans Müll. ♀ . . . (s. and c. *p.*) Apple, Pear, Cherry, Peach, Plum, Raspberry.
 (s.) Quince, Blackberry, Loganberry, Black Currant, Gooseberry.
 (c. *p.*) Medlar.
 (s. and *f. p.*) Red Currant.
A. angustior K. ♀ . . . (c. *p.*) Strawberry.
A. atriceps K. ♀ . . . (s. and c. *p.*) Apple.
A. bimaculata K. ♀ . . . (s. and c. *p.*) Apple.
A. carbonaria L. ♀ . . . (s.) Blackberry, Raspberry.
A. dorsata K. ♂ . . . (s.) Apple, Pear, Red Currant.
A. dorsata K. ♀ . . . (s. and c. *p.*) Apple, Pear, Plum.
 (s. and *f. p.*) Red Currant.
 (c. *p.*) Chestnut.
A. fulva Schr. ♀ . . . (s. and c. *p.*) Pear, Quince, Cherry, Plum, Red Currant, Gooseberry.
 (s.) Black Currant.
A. gwynana K. ♀ . . . (s. and c. *p.*) Pear, Plum.
 (s. and *f. p.*) Gooseberry.
 (s.) Blackberry.
A. helvola L. ♀ . . . (c. *p.*) Medlar, Strawberry.
A. minutuloides Perk. ♀ . . . (c. *p.*) Chestnut.
A. nana K. ♂ . . . (s.) Apple, Pear, Quince.
A. nana K. ♀ . . . (s. and c. *p.*) Apple.
 (s.) Pear, Quince, Red Currant.
A. nigroaenea K. ♀ . . . (s. and c. *p.*) Apple, Strawberry.
A. nitida Geoffr. ♂ . . . (s.) Apple, Raspberry.
A. nitida Geoffr. ♀ . . . (s. and c. *p.*) Apple, Plum, Raspberry.
 (s.) Cherry, Gooseberry.
A. parvula K. ♀ . . . (s. and c. *p.*) Apricot, Strawberry.
A. sericea Chr. ♂ . . . (s.) Apple, Raspberry, Red Currant.
A. sericea Chr. ♀ . . . (s. and c. *p.*) Apple, Medlar, Plum, Raspberry.
A. syndelpha Perk. ♀ . . . (s.) Raspberry.
A. thoracica F. ♀ . . . (s. and c. *p.*) Raspberry.
 (s.) Loganberry.
A. tibialis K. ♀ . . . (c. *p.*) Medlar.
A. wilkella K. ♂ . . . (s.) Apple, Raspberry.
A. wilkella K. ♀ . . . (s. and c. *p.*) Apple.
Haliplus cylindricus F. ♀ . . . (s.) Almond, Pear.
H. minutus K. ♀ . . . (s.) Medlar.
H. morio F. ♀ . . . (s. and c. *p.*) Blackberry, Loganberry.
H. nitidiusculus K. ♂ . . . (s.) Raspberry.
H. punctatissimus Schr. ♀ . . . (s.) Loganberry, Raspberry.
H. rubicundus Chr. ♀ . . . (s.) Pear.

Other Wild Bees.

<i>Nomada marshamella</i> K. ♂	(s.) Raspberry.
<i>N. goodeniana</i> K. ♀ . .	(s.) Red Currant.
<i>Prosopis communis</i> Nyl. ♂ .	(f. p.) Chestnut.

Sand Wasps.

<i>Ammophila sabulosa</i> L. ♀ .	(s.) Blackberry, Loganberry.
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Mason Wasps.

<i>Odynerus callosus</i> Thoms. ♀	(s.) Plum.
	(f. p.) Apple, Pear.

Social Wasps.

<i>Vespa norvegica</i> Fab. ♀ .	(s.) Apple.
	(f. p.) Chestnut.
<i>V. rufa</i> L. ♀	(s.) Apple, Gooseberry.
<i>V. sylvestris</i> Scop. ♀ . .	(s. and p. a.) Apple, Plum.
	(s.) Pear, Red Currant, Gooseberry.
<i>V. vulgaris</i> L. ♀ . . .	(s. and p. a.) Apple, Cherry.
	(s.) Quince, Black Currant, Red Currant, Gooseberry.

Ants.

<i>Lasius niger</i> L. ♀ . . .	(l. n.) Apple, Cherry, Peach, Black Currant, Red Currant, Gooseberry, Pear (also d. f. o.).
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Gall-Wasps.

<i>Cynips species</i> ♀ . . .	(cr.) Apple, Plum.
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Ichneumon Flies.

<i>Species</i> (?) ♀	(cr.) Apple, Pear, Strawberry.
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Sawflies.

<i>Hoplocampa testudinea</i> Klug. ♀	(o.) Apple.
<i>Pteronidea ribesii</i> Scop. ♀ .	(s.) Black Currant, Red Currant, Gooseberry.

DIPTERA.**Gall Midges.**

<i>Lasioptera rubi</i> Heeg. . .	(s.) Apple.
<i>Contarinia pyrivora</i> Riley ♀	(o.) Pear.

Fungus Gnats.

<i>Sciara</i> , several species . .	(s.) Apple, Pear, Quince, Cherry, Plum, Strawberry, Black Currant, Red Currant, Gooseberry.
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Fever Flies.

<i>Dilophus albipennis</i> Mg. .	(s.) Apple.
<i>D. febrilis</i> L.	(s.) Apple, Pear, Cherry, Strawberry, Red Currant.
<i>Bibio ferruginatus</i> Gmel. .	(s.) Medlar.
<i>B. hortulanus</i> L. . . .	(s.) Apple.
<i>B. marci</i> L.	(s.) Apple, Red Currant, Black Currant.

Midges.

<i>Chironomus plumosus</i> L. .	(s.) Apple.
<i>C. riparius</i> Mg. . . .	(s.) Apple, Pear.
<i>Orthocladius species</i> . .	(s.) Apple.
<i>Trichocladius annulipes</i> Mg.	(s.) Apple.

Bee Flies.

<i>Bombylius major</i> L. . . .	(s.) Apple.
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Hover Flies.

<i>Pipiza species</i> . . .	(f. p.) Chestnut.
<i>Chilosia longula</i> Zett. . .	(f. p.) Chestnut.
<i>C. scutellata</i> Flin. . .	(s.) Medlar.
<i>Platychirus albimanus</i> F. . .	(s.) Apple, Pear, Cherry.
<i>Catabomba selenitica</i> Mg. . .	(s.) Strawberry.
<i>Syrphus auricollis</i> Mg. var. <i>maculicornis</i> Zett. . .	(s.) Almond.
<i>S. balteatus</i> De G. . .	(s.) Apple.
	(f. p.) Chestnut.
<i>S. bifasciatus</i> F. . .	(s.) Medlar, Loganberry.
<i>S. cinctus</i> Flin. . .	(s.) Medlar.
<i>S. luniger</i> Mg. . .	(s.) Apple.
<i>S. lunulatus</i> Mg. . .	(s.) Strawberry.
<i>S. ribesii</i> L. . .	(s.) Apple, Medlar, Plum, Raspberry, Red Currant, Gooseberry (also f. p.).
<i>S. torvus</i> O.-S. . .	(s.) Apple, Pear, Quince, Cherry, Plum, Black- berry, Loganberry, Raspberry, Black Currant, Red Currant, Gooseberry (also f. p.).
<i>S. venustus</i> Mg. . .	(s.) Strawberry.
<i>S. vittiger</i> Zett. . .	(s.) Loganberry.
	(f. p.) Chestnut.
<i>S. vitripennis</i> Mg. . .	(s.) Blackberry, Loganberry, Raspberry.
<i>Sphaerophoria menthastris</i> L. ♂ and ♀ . . .	(s.) Medlar.
<i>Rhingia campestris</i> Mg. . .	(s.) Medlar, Cherry.
<i>R. rostrata</i> L. . .	(s. and f. p.) Apple, Pear, Blackberry.
<i>Volucella bombylans</i> L. . .	(s.) Apple, Plum.
<i>V. pellucens</i> L. . .	(s.) Apple, Blackberry, Loganberry, Raspberry.
<i>Eristalis arbustorum</i> L. . .	(s. and f. p.) Apple, Pear, Cherry.
	(s.) Plum, Blackberry, Loganberry, Raspberry, Strawberry, Red Currant.
	(f. p.) Chestnut.
<i>E. intricarius</i> L. . .	(s. and f. p.) Apple, Blackberry.
	(s.) Plum, Loganberry, Raspberry.
<i>E. nemorum</i> L. . .	(s.) Blackberry, Loganberry.
<i>E. pertinax</i> Scop. . .	(s. and f. p.) Apple, Pear, Cherry, Plum, Black- berry, Loganberry, Raspberry, Black Currant, Red Currant, Gooseberry.
<i>E. tenax</i> L. . .	(s. and f. p.) Apple, Pear, Quince, Cherry, Almond, Peach, Plum, Blackberry, Loganberry.
<i>Myiatropa florea</i> L. . .	(s.) Loganberry.
<i>Merodon equestris</i> F. . .	(s.) Apple, Cherry.
<i>Brachypalpus bimaculatus</i> Mcq. . .	(s.) Apple.
<i>Syrilla pipiens</i> L. . .	(f. p.) Chestnut.
<i>Chrysotoxum cautum</i> Harr. . .	(s.) Medlar.

Anthomyids.

Anthomyids, several undeter- mined species	(s.) Apple, Pear, Quince, Medlar, Cherry, Almond, Plum, Blackberry, Loganberry, Raspberry, Strawberry, Red Currant, Black Currant, Gooseberry.
	(f. p.) Chestnut.

Muscid Flies.

<i>Pollenia rudis</i> F. . .	(s.) Apple, Pear, Almond.
<i>Musca autumnalis</i> De G. (<i>corvina</i> F.) . . .	(s.) Apple, Pear, Cherry, Almond, Plum.
	(f. p.) Chestnut.
<i>Morellia oenescens</i> R. D. . .	(f. p.) Chestnut.
<i>Pyrellia eriophthalma</i> Mcq. . .	(s.) Apple.
<i>Calliphora erythrocephala</i> Mg. (bluebottle) . . .	(s.) Apple, Pear, Quince, Cherry, Almond, Apricot, Peach, Plum, Blackberry, Loganberry, Straw- berry, Black Currant, Red Currant, Gooseberry.
<i>Muscina pabulorum</i> Fall. . .	(s.) Apple, Pear.
<i>Lucilia species</i> (greenbottle)	(s.) Pear, Peach, Plum.

<i>L. caesar</i> L. . . .	(s.) Apple, Quince, Almond.
<i>L. illustris</i> Mg. . . .	(f. p.) Chestnut.
<i>Dasyphora cyanella</i> Mg. . . .	(f. p.) Chestnut.
<i>Lypha dubia</i> Fall. . . .	(s.) Medlar.

Dung Flies.

<i>Scatophaga stercoraria</i> L. ♂	(s. and f. p.) Pear, Plum.
	(s.) Apple, Almond, Strawberry, Red Currant, Gooseberry.
<i>S. stercoraria</i> L. ♀ . . .	(s. and f. p.) Plum.
	(s.) Apple, Pear, Almond, Strawberry, Black Currant, Red Currant, Gooseberry.

Flesh Flies.

<i>Sarcophaga</i> sp. . . .	(f. p.) Chestnut.
<i>S. carnaria</i> L. . . .	(s.) Blackberry, Loganberry, Raspberry.
<i>S. vicina</i> Vill. . . .	(f. p.) Chestnut.

Other Flies.

<i>Dicranomyia chorea</i> Mg. . .	(s.) Apple.
<i>Chloromyia formosa</i> Scop. .	(f. p.) Chestnut.
<i>Neoitamus cyanurus</i> Lw. . .	(f. p.) Chestnut.
<i>Machimus atricapillus</i> Flin.	(f. p.) Chestnut.
<i>Empis</i> sp. . . .	(s.) Apple.
<i>E. opaca</i> F. . . .	(s.) Apple, Red Currant.
<i>E. tessellata</i> F. . . .	(s.) Apple, Medlar, Blackberry.
<i>Hilara</i> sp. . . .	(s.) Apple, Plum.
<i>Myopa polystigma</i> Rnd. . .	(s.) Apple, Medlar, Cherry.
<i>Myiodina (Seoptera) vibrans</i> L.	(f. p.) Chestnut.
<i>Lonchaea chorea</i> F. . . .	(s.) Medlar.
<i>Drosophila</i> sp. . . .	(s.) Apple, Almond.
<i>Dexia rustica</i> F. . . .	(s.) Blackberry, Red Currant.
	(f. p.) Chestnut.

COLEOPTERA.

<i>Anisodactylis binotatus</i> F.	
(Carabid beetle)	(l. n.) Apple.
<i>Philonthus species</i> (Staphylinid)	
.	(l. n.) Pear, Plum, Gooseberry.

Ladybirds.

<i>Adalia bipunctata</i> L. . . .	(l. n. and p. a.) Apple, Cherry, Plum, Blackberry, Raspberry.
	(l. n.) Pear, Quince, Loganberry, Red Currant, Gooseberry.
<i>Coccinella septempunctata</i> L.	(l. n.) Apple, Pear, Quince, Cherry, Plum, Black Currant, Red Currant, Gooseberry.
<i>C. undecimpunctata</i> L. . .	(l. n.) Apple.
<i>Halysia quatuordecimguttata</i>	(l. n.) Apple, Red Currant, Gooseberry.

Blossom Beetles.

<i>Meligethes aeneus</i> F. . . .	(l. n. and f. p.) Apple, Pear.
	(l. n.) Medlar, Strawberry.
<i>M. viridescens</i> F. . . .	(f. p.) Chestnut.

Chafers.

<i>Melolontha vulgaris</i> F. . .	(d. f. o.) Quince.
<i>Phyllopertha horticola</i> L. .	(d. f. o.) Apple, Raspberry.

Other Beetles.

<i>Byturus tomentosus</i> F. (Raspberry beetle)	(l. n. and d. f. o.) Apple, Loganberry, Raspberry.
	(l. n.) Red Currant.
<i>Atomaria linearis</i> Steph. .	(l. n.) Apple.
<i>Aphodius inquinatus</i> F. . .	(l. n.) Apple, Pear, Red Currant.
<i>Elaeter balteatus</i> L. . . .	(l. n.) Apple.

<i>Athous haemorrhoidalis</i> F.	(l. n. and d. f. o.) Medlar.
<i>Limoniis cylindricus</i> Payk.	(l. n.) Apple, (also d. f. o.) Plum, Red Currant.
<i>Corymbites pectinicornis</i> L.	(l. n.) Quince.
<i>Telephorus rusticus</i> Fall.	(l. n.) Apple.
<i>Malachius bipustulatus</i> L.	(l. n.) Apple.
<i>Opilo mollis</i> L.	(l. n.) Apple.
<i>Clytus arietis</i> L. (Wasp beetle)	(l. n.) Blackberry, Loganberry, Red Currant.
<i>Strangalia armata</i> Herbst.	(l. n. and d. f. o.) Blackberry, Loganberry. (f. p.) Chestnut.
<i>Grammoptera ruficornis</i> F.	(l. n.) Pear, Medlar, Strawberry (also d. f. o.).
<i>Tetrops praeusta</i> F.	(l. n. and f. p.) Medlar.
<i>Lema melanopa</i> L.	(l. n.) Apple, Plum.
<i>Luperus rufipes</i> Scop. (<i>betulinus</i> Joann.)	(f. p.) Chestnut.
<i>Lochmaea saturalis</i> Thoms.	(l. n.) Pear.
<i>Cassida viridis</i> F. (Tortoise beetle)	(l. n.) Apple, Pear.

Weevils.

<i>Rhynchites aequatus</i> L. (Snout weevil)	(d. f. o.) Apple, Quince.
<i>Strophosomus coryli</i> F. (Nut-leaf weevil)	(cr.) Quince.
<i>Phyllobius oblongus</i> L.	(l. n.) Black Currant. (d. f. o.) Apple.
<i>P. pyri</i> L. (Pear-leaf weevil)	(d. f. o.) Apple, Pear, Quince.
<i>Hyllobius abietis</i> L. (Pine weevil)	(cr.) Cherry.
<i>Anthonomus pomorum</i> L. (Apple blossom weevil)	(d. f. o.) Apple, Pear.
<i>Cionus scrophulariae</i> L.	(cr.) Pear.

LEPIDOPTERA.**Butterflies.**

<i>Vanessa io</i> L. (Peacock)	(s.) Apple, Plum.
<i>Epinephele ianira</i> L. (Meadow Brown)	(s.) Blackberry.
<i>Lycaena icarus</i> Rott. (Common Blue)	(s.) Apple.
<i>Gonopteryx rhamni</i> L. ♂ (Brimstone)	(s.) Apricot.
<i>Pieris napi</i> L. ♂ (Green-veined White)	(s.) Cherry, Blackberry.
<i>P. rapae</i> L. ♀ (Small Cabbage White)	(s.) Apple, Strawberry.

Moths.

<i>Aegeria tipuliformis</i> Cl. (Currant Clearwing)	(cr.) Raspberry.
<i>Monima gracilis</i> F. (Powdered Quaker)	(s.) Plum.
<i>Anarta myrtilli</i> L. (Beautiful Yellow Underwing)	(s.) Red Currant.
<i>Plusia gamma</i> L. (Silver Y)	(s.) Raspberry.
<i>Eupithecia species</i> (Pug)	(s.) Black Currant, Gooseberry.
<i>E. rectangulata</i> L., larva (Green Pug)	(d. f. o.) Apple, Quince.
<i>Cheimatobia brumata</i> L., larva (Winter)	(d. f. o.) Apple, Quince, Cherry.

PLECOPTERA.

<i>Perla species</i> (Stonefly)	(cr.) Apple.
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MECOPTERA.

<i>Panorpa communis</i> L. (Scorpion fly)	(l. n.) Apple.
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HEMIPTERA-HETEROPTERA.

Plant Bugs.

- Palomena prasina* L. . . (cr.) Chestnut.
Pentatoma rufipes L. . . (cr.) Loganberry.

Predaceous Bug.

- Anihocoris nemorum* L. (Red Spider Predator) . . . (cr. and p. a.) Apple, Raspberry, Red Currant.

HEMIPTERA-HOMOPTERA.

- Triecphora vulnerata* Illig. (Froghopper) . . . (cr.) Apple.

Aphides.

- Anuraphis helichrysi* Kalt. (Leaf-curling aphis) . . . (cr.) Plum.
A. roseus Baker (Apple blue bug) . . . (cr.) Apple.
Amphorophora rubi Kalt. (Raspberry aphis) . . . (cr.) Raspberry, Loganberry.
Aphis grossulariae Kalt. (Gooseberry aphis) . . . (cr.) Gooseberry.

THYSANOPTERA.

- Thrips species* . . . (s. and d. f. o.) Apple, Pear, Strawberry.

DERMAPTERA.

- Forficula auricularia* L. (Earwig) . . . (l. n. and d. f. o.) Apple, Plum, Blackberry.

I wish to acknowledge with grateful thanks my indebtedness to Mr. F. J. CHITTENDEN for his continued interest and help in the work, and to the many specialists who have made determinations and confirmed the nomenclature in the following groups of insects—viz. *Hymenoptera-Aculeata*, Mr. R. B. BENSON (British Museum), Mr. H. BRITTEN (University of Manchester), and the late Mr. E. B. NEVINSON (Cobham, Surrey); *Diptera*, Mr. F. W. EDWARDS and Miss D. AUBERTIN (British Museum); and *Coleoptera*, Mr. F. LAING (British Museum).

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXVI.—NOTE ON THE HYDROGEN ION CONCENTRATION
IN FRUIT EXTRACTS.

By B. H. BUXTON and F. V. DARBISHIRE, M.A., Ph.D.

DURING the past two years we have been gradually accumulating some data regarding the pH values of certain fruits, with the results shown in the tables. Almost all of the tests were made twice: one series in 1930, and a second in 1931. The differences between the two series were found to be very slight, not exceeding $pH \cdot 1$ or $\cdot 2$; hardly sufficient to be worth recording in the tables. At the same time it has become evident that it is useless to make any attempt at very accurate determination in each case, and it is best to say that the given pH is approximately correct, with possible error of $\pm \cdot 1$, or perhaps rarely $\pm \cdot 2$.

The fruits, or other specimens, were mashed and filtered through asbestos in a water-pump vacuum: the filtrates as a rule came through clear, but if not, a slight cloudiness did not appear to affect the pH value in any way. The filtrates were then tested in an apparatus with quinhydrone electrodes, designed by BROOM and BROWN of the Wellcome Research Bureau, and for control a colour test was also made by the B.D.H. capillator method.

The B.D.H. capillator cannot be used if there is much anthocyanin pigment in the extract, since the indicator colour is masked, and even in extracts without any anthocyanin there is usually a yellowish tinge which prevents very accurate determination, though sufficiently near to make certain that the pH , as determined by the quinhydrone electrode, must be approximately correct.

On the other hand, there are occasional plant extracts which react in some way with the quinhydrone almost immediately after it has been added, changing the pH to some extent. Such a reaction has not been observed in fruit extracts, but sometimes, though infrequently, with extracts from stems or tubers. In such cases one has to rely on the colour tests alone.

The extracts naturally give the mean of the whole sap, no distinction being made between the xylem and phloem, which, according to SMALL and PEARSALL,* have very different pH reactions, the xylem, *ca.* pH 4–5, being always much more acid than the phloem, *ca.* pH 6–7; but their reports were based on examination of stems and tubers which, according to our observations, have an average mean value approximating to pH 5–6, which is considerably less acid than is usual with the fruits.

* *Science Progress*, No. 77, July 1925.

TABLE I.
pH value of sap of small fruits.

	Stem.	Unripe.	Ripe.
Strawberry . . .	5.2	3.6	3.8
Raspberry . . .	5.0	3.0	3.4
Currant, Black . . .	5.5	3.0	3.1
„ Red . . .	4.7	2.6	2.6
Gooseberry . . .	4.5	3.0	2.8
Blackberry . . .	5.2	3.0	3.0
Cranberry . . .	—	—	2.7

TABLE II.
pH value of sap of stone fruits.

	Unripe.	Ripe.
Plum, Damson . . .	—	3.0
„ Purple . . .	3.2	3.3
Cherry, Morello . . .	—	3.4
„ White . . .	4.0	—
Peach . . .	3.6	3.6
Nectarine . . .	—	3.6

TABLE III.
pH value of sap of large fruits.

	Unripe.	Ripe.
Apple, Crab . . .	3.0	3.2
„ Sweet . . .	3.0	3.5
Fig . . .	4.5	4.5
Grape . . .	3.0	3.4
Medlar . . .	—	3.2
Pear . . .	4.2	4.5
Pineapple . . .	—	3.2
Quince . . .	3.0	3.0
Tomato . . .	4.2	4.2
Melon . . .	—	6.0
Citrus, Orange . . .	—	3.5
„ Lemon . . .	—	2.8
„ Grape Fruit . . .	—	3.0

TABLE IV.
Miscellaneous items.

	pH.		pH.
Onion . . .	6.0	Hyacinth bulb . . .	5.6
Potato . . .	6.0	Tulip bulb . . .	5.6
Turnip . . .	6.2	Cabbage stalk . . .	6.7
Beetroot . . .	5.3	Rhubarb stalk . . .	3.5
Carrot . . .	5.8	Cucumber . . .	5.7
Artichoke . . .	6.5		

TABLE V.

	Stem.	Very Small Unripe.	Large Unripe.	Ripe.
Blackberry . . .	5.2	3.6	3.0	3.0
Fig	5.9	5.9	4.5	4.5
Tomato	5.2	4.8	4.2	4.2

On reviewing the tables it will be noticed that the fruits are very acid, between pH 3 and pH 4 for the most part, and, rather unexpectedly, the unripe fruits were found to be very slightly, if at all, more acid than the ripe ones. It seems evident that the sweeter taste of the ripe fruits must be due to increase of sugar content rather than to any appreciable change in the acidity.

In Table IV the pH of a small number of miscellaneous items—tubers, roots, etc.—is given to show how much less acid they are than the fruits (Rhubarb alone being very acid); and the same is also evident in Table I, where young green shoots from the stems are rarely under pH 5, while the corresponding fruits are well below pH 4. The unripe fruits of the first three tables were tested when nearly full size, but in a few instances very small fruits were also tested, with the results given in Table V. At a very early stage the pH of the fruits appears to be intermediate between that of the stems and the fruit at later stages, the acidity gradually increasing as the fruit grows larger.

The Blackberry, owing to its small size, could not be taken at such an early stage as the Fig or Tomato, and is already far on the way towards greater acidity.

SMALL * (1929) cites pH values of ripe fruits and plant extracts from CLARK and LUB. (1917), and McCLENDON and SHARP (1919), and from these Table VI has been compiled for comparison with the results obtained by ourselves. On the whole, the agreement is fairly good, although there are a few rather large discrepancies, more particularly among the items classed as sundries in Table IV. SMALL has detected, in many instances, distinct seasonal pH variations in stems and leaves, though naturally this would not apply to fruits. SMALL, however, does not deal with extracts as a whole, but differentiates between xylem, phloem, and other tissues by staining sections with appropriate indicators, only attempting to determine a range, usually 0.2, but not exceeding 0.4, within which the actual pH must lie. He goes on to discuss whether an exact pH value for extracts can be determined, and comes to the conclusion that it is only approximately possible, on account of various errors involved, chief among which is loss of carbon dioxide during manipulation. Such loss would make the extracts appear somewhat less acid than the actual tissue, and

* SMALL, *Hydrogen Ion Concentration in Plant Cells and Tissues*, vol. ii. (Berlin, 1929.)

it would be impossible to determine what correction should be made for this.

TABLE VI.

	Our determination.	Cited by SMALL.	
		CLARK and LUB.	McCLENDON and SHARP.
Strawberry . . .	3.5	3.4	—
Cherry . . .	3.4	2.5	—
Apple . . .	3.5	3.76	—
Pineapple . . .	3.2	3.4	—
Tomato . . .	4.2	4.2	—
Orange . . .	3.5	3.55	3.1
Lemon . . .	2.8	2.32	2.2
Grape Fruit . . .	3.0	3.0	—
Cabbage . . .	6.7	5.9	5.9
Rhubarb . . .	3.5	3.1	—
Cucumber . . .	5.7	5.08	—
Potato . . .	6.0	6.06	5.87
Beet . . .	5.3	6.07	—
Carrot . . .	5.8	5.21	5.85

Since the expression pH is used throughout in this note, it seems advisable to give a brief explanation of its meaning.

The pH value is merely a conventional method of expressing the degree of acidity— pH 1 is very acid, and pH 2, pH 3, etc., are less and less acid to pH 7, which is neutral. From pH 8 to pH 13 the medium becomes more and more alkaline, the lessening acidity being masked by the increasing degree of alkalinity.

The H (hydrogen) atom represents the measure of the acidity, and the K (potassium) atom may be taken as representing the alkalinity. The diagram shows the relative quantities at each pH , taking the arbitrary number of a million million H (10^{12}) to start with at the acid end.

pH .	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.
H atoms	10^{12}	10^{11}	10^{10}	10^9	10^8	10^7	10^6	10^5	10^4	10^3 (1,000)	10^2 (100)	10^1	10^0
K atoms	1^0	10^1	10^2 (100)	10^3 (1,000)	10^4	10^5	10^6	10^7	10^8	10^9	10^{10}	10^{11}	10^{12}

Acid ← ↓ → Alkaline
Neutral

The word "atom" connotes a neutral particle, but in solution the atoms are ionized and bear an electric charge, either + (basic) or — (acid). Strictly speaking, therefore, the word "ion" should here be used instead of atom. The ions H^+ and K^+ are both bases, but the H^+ ion is a weak base which allows the acid, with which it is combined, to outweigh it. The K^+ ion is a strong base which outweighs any weak acid with which it may be combined.

The reaction involved may be taken as $K^+ + OH^-$ (potassium hydroxide. Strong base and weak acid, *i.e.* alkaline) and $H^+ + Cl^-$ (hydrochloric acid. Weak base and strong acid, *i.e.* acid) = $K^+ + Cl^-$ (strong base and strong acid, *i.e.* neutral) + H_2O (water, not ionized, *i.e.* neutral), or put shortly $KOH + HCl = KCl + H_2O$.

Unless the two are exactly balanced, as at pH 7, there is an excess of one or other of the ions, either H^+ or K^+ ; but there are always a few of the minority ions present, and also the neutral K^+Cl^- ions. That this is so can be understood from the fact that the ions are constantly changing partners (several thousand times a second), so that at any instant of time, although, say, K^+ and OH^- ions are in excess, there are always a few unattached H^+ and Cl^- ions which may combine for a moment and then separate again.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXVII.—A LUPIN DISEASE DUE TO *CERATOPHORUM SETOSUM* (Kirchner), A FUNGUS NEW TO GREAT BRITAIN.

By D. E. GREEN, M.Sc., Mycologist.

ABOUT the third week in July 1932 a large number of young plants of *Lupinus cytisoides* in the nursery beds at Wisley were seen to be attacked by a disease. The plants had been raised in a seed-bed in the open from seed collected from healthy plants in the garden, and had been planted out about mid-June. They had established themselves and had made sturdy growth.

The attack took the form of a leaf spot which rapidly spread to all the plants, killing first the basal leaves, then spreading upwards to infect the upper leaves as they developed. The bareness of the stems was most marked, and the further growth was spindly, with never more than the top four or five young leaves in a healthy condition. Lifting some of the badly affected plants revealed that their root-systems were extensive and quite healthy.

Examination of the affected plants showed that the disease was the result of attack by the fungus *Ceratophorum setosum* Kirchner, this being the first time this fungus has been recorded in this country.

It has, however, been recorded in Germany (Kirchner and Weiss), Denmark (Rostrup), and Switzerland (Volkart), as attacking *Cytisus capitatus* and *C. Laburnum*.

A small experiment was carried out in the laboratory in which fresh leaves of *C. capitatus* and *C. Laburnum* were sprayed with water containing a suspension of the spores of the fungus. The leaves of *C. capitatus* were soon badly spotted and killed; those of *C. Laburnum* were also attacked and spotted, but not so quickly. Fresh leaves of both plants sprayed with water alone remained green and healthy.

The first sign of attack on the leaf is the appearance of small spots of pinpoint size, purplish-black, and plainly visible on both upper and lower surfaces of the leaf blade. The spots rapidly increase in size, turning greyish-brown; they are more or less circular, the outer edge merging into a light yellowish-green zone. The centre of the spot is generally very dark brown, and outside it, in roughly concentric circles, light and dark rings alternate (figs. 20, 21).

Other spots quickly arise and sometimes large diseased areas are formed. The leaf very soon shrivels up and is killed.

The description of the causal organism in this preliminary note is necessarily brief. Infection occurs by means of spores, which are

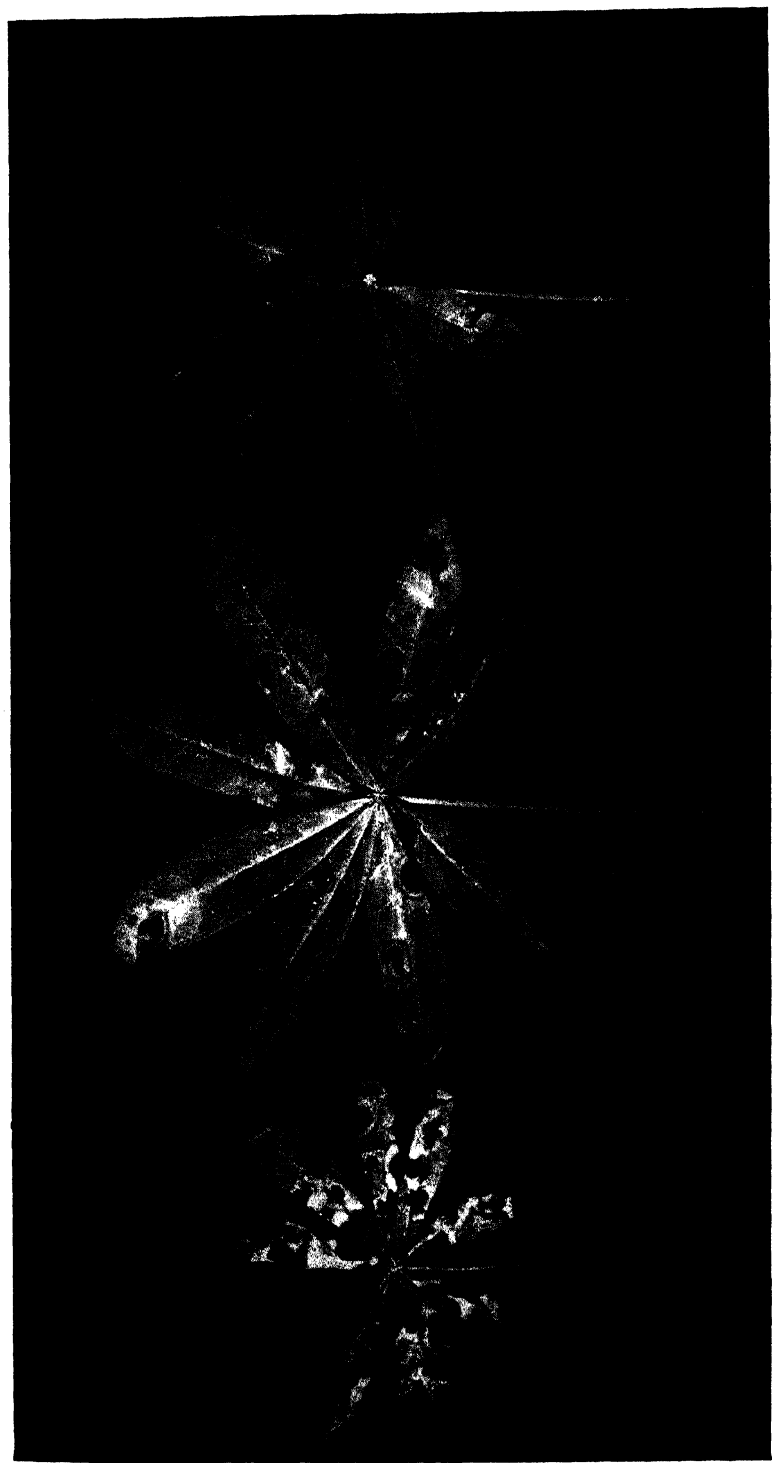


FIG. 20.—LUPIN DISEASE CAUSED BY CERATOPHORUM SETOSUM. Progressive stages shown from right to left.

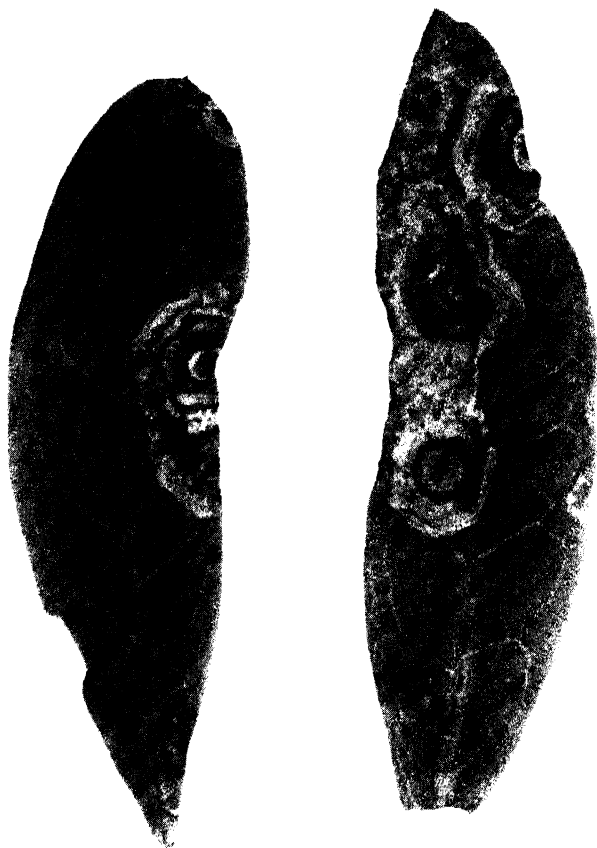


FIG. 21.—LEAF-SPOT OF LUPIN CAUSED BY *CERATOPHORUM SETOSUM* (enlarged).

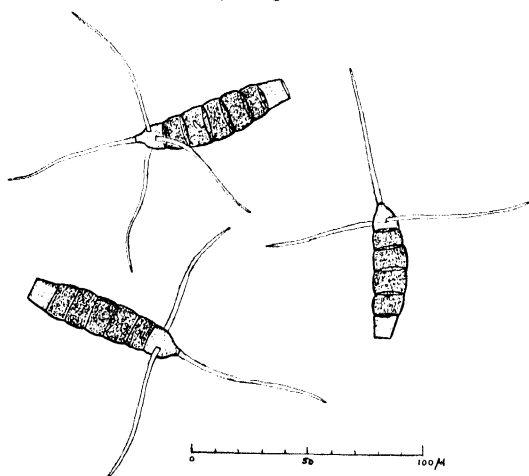


FIG. 22.—SPORES OF *CERATOPHORUM SETOSUM*.

produced on both sides of the leaf on the surfaces of the spots. The spores are roughly $62\ \mu$ in length, $17\ \mu$ in breadth, spindle-shaped, dark brown when mature, and have two to seven (mostly five) septa (cross walls) (fig. 22). The end cells are lighter in colour and the apical cell is provided with four (sometimes more) long, tapering, threadlike setæ (bristles). These setæ are about as long as the spore itself when mature, and are colourless.

Observation this summer showed that all the *Lupinus cytisoides* seedlings suffered severely, and seedlings of *L. polyphyllus* adjacent to the *L. cytisoides* also became badly spotted by the same fungus, but the disease did not spread beyond the first three or four rows. Some spots on the leaves of mature plants of *L. polyphyllus* established in the gardens were also found to be caused by this fungus, but so far the evidence indicates that *L. polyphyllus* is very resistant to attack by it.

The possibility of the young plants having been checked by dry conditions and so having become more susceptible to attack by a parasite was considered, but there was no reason for water-shortage in this case. Although dry conditions prevailed during June there was a rainfall of 1.14 inches recorded for the last day in the month. The first ten days of July were dry, but then occurred a week of moderate rain with one day of heavy rain.

Control.

Some preliminary sprayings with Bordeaux mixture and lime sulphur (1 in 30 and 1 in 60) were carried out, but, as can be imagined, it was found extremely difficult to get a spray to adhere to the foliage of Lupins. The Bordeaux-sprayed plants were uninjured, but damage was done by the lime sulphur at both the above strengths. The disease was not checked, but this was expected, as effective covering of the foliage with a fungicide had failed, and continual rain hindered spraying tests.

It is possible that repeated light sprayings with Bordeaux mixture, using saponin as a "spreader," or repeated dustings with green sulphur, would check this parasite.

As seeds of *Lupinus cytisoides* have been sent out from Wisley for the past five years, it is possible that the plant may be raised in quantity in some gardens, and the present note is written as a warning against the occurrence of this parasite on the seedlings.

The life-history of the fungus, the possibility of its continuing to injure these plants next season, and methods of control, will be further investigated.

THORPE HALL: AN AMATEUR'S GARDEN.

By THE VISCOUNTESS BYNG OF VIMY.

It was with much diffidence that I agreed to write on the making of my garden, because I have had no botanical training, my knowledge is of the most limited, and the longer I garden the more I realize my ignorance in the whole matter. These notes, therefore, are intended only for plant-lovers of my own humble calibre, and they may perhaps appeal to them more than if they were the acme of horticultural erudition, or weighted with all those botanical minutiae which scare many amateurs.

Thorpe Hall gardens are an attempt to evolve order from the chaos and neglect I found, and to experiment with plants collected in the various lands to which Fate has drifted us in the past decade and where, according to my husband—who is no gardener—the contours have been wrecked by my passage, craters left in place of mountains and mountains in place of valleys! Well, I have grubbed with immense pleasure in many countries, and in placing my spoils at home have tried to avoid making the garden either a museum of plants more rare than beautiful, or the flamboyant splurge of easily attained colour which is the antithesis of the former. I have set my face against the segregation of rare plants from their more ordinary fellows, because in relegating “treasures” to special beds or corners the visitor is apt to be surfeited with rarities and lose the interest of finding something new cheek by jowl with an old friend. To my mind both sections of plants gain by juxtaposition, and the visitor is kept on the alert for novelties. Another firm rule is the banishment of invalids. A plant is thoroughly tested and given all that is possible to make it happy, and if after that it still fails, out it goes. I hate sickly twigs.

In July 1913 the place, when I first saw it, was a wilderness—empty for four years and, I should think, neglected for forty. The gates were divorced from their hinges, the house was not weatherproof, weeds abounded, and the white scuts of a vast population of rabbits flitting everywhere accounted for the lack of all plants except some old pæonies (*Paeonia officinalis*), masses of laurel, ivy, sweet bay, and *Rhododendron ponticum*. But there were two redeeming features: magnificent trees and water in abundance. After all, what is any garden worth without these as a groundwork? Most tempting of all to the ardent gardener were two big *Eucalyptus Globulus* trees and their self-sown seedlings on the brink of a triangular pond to the south of the house. The temptation was certainly too great for me, and, regardless of the fact that my husband was not at hand to agree, I made the purchase. In self-defence I must explain that within ten days the place was to be sold by auction with far more land than we wanted

or could afford to buy, and also I had been sent home from Egypt for the purpose of looking for a home, as we had decided at that time to quit soldiering and settle down—though practically twelve years were to elapse before we really did so. I shall never forget the day, six weeks after my purchase, when, rather in fear and trembling, I brought my lord and master to see his future home, and as he leant against a battered iron railing that separated the house from a rough meadow, he remarked dryly : “ Oh yes, very nice—and first row of the stalls for the German invasion when it comes.”

It was a startling remark, nor did his explanation make things better when he told me that many years ago, on a staff ride round this part of Essex, he, having been detailed to act as the attacker, had chosen an inlet within a couple of miles as his landing-place, and the ridge from thence, through Thorpe towards Harwich, as the gun position to cover his landing and advance—an interesting chat on military matters that I remembered clearly when, exactly twelve months later, the Flanders and North Sea guns started their booming that was to continue through four weary years. As it eventually proved, this scheme of his really was part of the German plan which, thank goodness, went agley. The inhabitants of Thorpe-le-Soken from 1914 to 1918 fortunately had no idea of these matters, and I certainly was not going to enlighten them !

Thorpe Hall, according to Morant, dated back to monastic days, and we found relics in the shape of some daub and wattle inside the house when making alterations, and in the grounds stewponds at different levels. The biggest of these was a rectangle of water extending then to about an acre—now to considerably more—and on that July day the covering of blanket-weed was so thick that a light pebble thrown on to it could not sink for an appreciable time. No breath of air could reach the pond, owing to a gargantuan hedge about 20 feet high, composed of every horror known to nature. To the west and below the hedge lay a green meadow whose lushness betrayed moisture in considerable quantities. Here the ground dribbled away from the front door in an indefinite two-way slope that made everything look just out of the straight in a most exasperating fashion. I soon found that this two-way slope prevailed right through the place and added considerably to the difficulties of garden planning. The big pond ended in a small horseshoe-shaped copse filled with splendid trees, descendants of the Essex forests which had sheltered Boadicea's troops. On the south bank of the pond stood a magnificent *Taxodium distichum*, crippled by an intrusive oak sapling, that I promptly removed ; and on the north a very old mulberry which, having been blown down in some long past gale, hung at a picturesque angle over the water. Of garden there was none, though the estate agent had the effrontery to call a rank piece of uncut grass to the south of the house a “ spacious lawn,” and a dozen apple trees riddled with American Blight “ a prolific orchard.” However, there it was : I had to do my best with what I had bought.

I suppose a wise person would have begun operations on the "spacious lawn" because it was the most visible from the windows, but I did not, for the lush meadow on the north promised more opportunities in development than a humdrum lawn. So in that meadow I started working early in 1914, to find that my predecessors had vainly tried to drain the springs it contained with every form of drain, from the hollowed elm trunk to "tops and bottoms" and the more modern land drain. Seeing their failure, I decided to bring the water to the surface. This was done by excavating two ponds, at different levels, in the lowest part of the field and utilizing the soil in altering that tiresome double slope into a series of valleys and hills. It was interesting work, that came, alas! to an abrupt pause in August 1914, when the place was turned into a hospital and the park into a camp. However, by dint of doing a bit here and a bit there, whenever we could, the groundwork was finished and to a great extent planted by 1921, when we went to Canada for five years, and I gardened at Government House, Ottawa, and plant-hunted from the Maritimes to the Rockies; but in 1921 the embryonic water garden already promised well, and I think it has fulfilled that promise. It is bounded at the lowest level by a steep bank with a full southern aspect that completely baffled me until, this autumn (1932), I called in Colonel GAVIN JONES, that most expert of "rockmen," who has made a lifelong study of rocks, and he solved the problem, so that my fingers itch for springtime, when I can fill the nooks and crannies—beautifully sheltered—that await the Californian, South African and Tasmanian treasures which are cramming our small amount of available greenhouse space. The whole of the water garden is so well sheltered that even in winter one can sit there in perfect comfort; and in summer it is scorchingly hot, owing to this being in one of the driest belts in England, and the sunniest.

I am often asked, rather fretfully at times, by fellow-gardeners why we can grow so many tender things in a county that strangers are apt to look upon as more or less sub-arctic! I believe it comes from the dryness of the climate, the fact that we have sea north, south, and east of us to temper frosts, and, above all, because there is an acknowledged but unexplained temperate belt three miles inland along the North Essex and South Suffolk coasts, and, thank goodness, we are in the centre of that zone.

These climatic advantages I assist by a certain amount of winter protection in the following way: In late November or early December (according to the weather conditions) we top-dress heavily with equal portions of leaf-mould, sand and peat, and for lime-lovers we replace the peat with lime, or old mortar rubble well screened through a fine sieve. Where exceptionally tender things are concerned they get a sheet of glass on a long zinc peg, provided by the Chase Continuous Cloche firm. These pieces of glass, being placed at an angle, protect the crowns of the plants from all stagnant wet but allow a free current of air to reach them, for I believe that in England more harm comes as a rule from damp than frost. This, I think, is borne



FIG. 23.—SOUTH AND WEST FRONTS OF THORPE HALL.

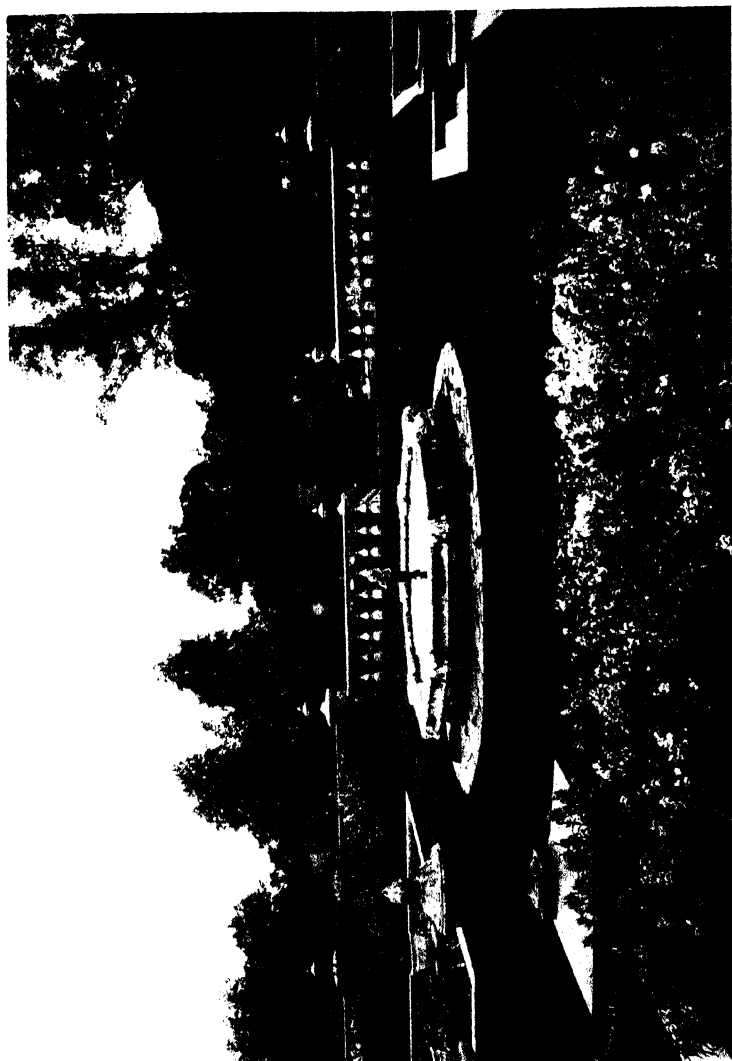


FIG. 24.—CENTRAL LEVEL OF THE SUNK GARDEN, THORPE HALL.



FIG. 25.—WELL IN THE GARDEN AT THORPE HALL.



FIG. 20.—THE SUNK GARDEN AT THORPE HALL, WITH ROLLING COUNTRY BEYOND.

To face p. 149.

out by such plants as *Opuntias*, that will grow in Canada on the prairies, where often many degrees below zero are registered before the snow blanket descends to protect them, but these same plants in England will promptly die if allowed to get too damp.

The water garden contains many of my most tender treasures, sheltered by a heavy planting of shrubs, some of them gifts from friends, others purchased, but more largely chance seedlings of our own, gathered from different corners and, therefore, unnamed hybrids. Mr. EDWIN HILLIER, who paid me a visit in the summer of 1931, was very complimentary about them, and named as many of the hybrids as he could. The biggest plants are as follows : a *Cotoneaster* with evergreen shining foliage and bright scarlet fruits in corymbs, 57 feet in circumference and 14 feet high ; *C. horizontalis*, 66 feet round, spreading itself on a big mound, where it shows well ; a Japanese Yew (*Podocarpus chilina*) making a compactly rounded bush, 18 feet by 6 feet 3 inches ; *Pinus radiata*, planted in 1916, from my brother-in-law Mr. JOHN BOSCAWEN's Cornish garden, making a 28-foot protection on the drive side. All these were seedlings or two-year-old plants in 1916, and the *Salix vitellina ramulis aureis*, now 50 to 60 feet in height and with a proportionate spread, were saplings, purchased from Mr. WALLACE that same year. Regarding these *Salix*, I think people are often disappointed in them, for they grow densely and lose all beauty of form unless well cared for. We thin ours back vigorously at least every second season, when they are in full foliage, as otherwise it is impossible to see what to remove. The following *Berberis* have helped to furnish the water garden : *B. Irwinii*, *B. Sargentiae*, *B. Veitchii*, *B. Prattii*, *B. Thunbergii atropurpurea* (a Canadian seedling), and *B. Wilsonae*—a faithful ally. In the upper reaches of the water garden are *Yucca gloriosa* and *Y. filamentosa*. Two of the former bloom in December—why, I have never understood, for they are from the same batch and planted out at the same time as the rest, which flower at the proper season. Certainly some plants are queer. *Yucca Whipplei* is on trial, though I fear it will be but a shadow of the glorious specimens I saw last spring adorning the Californian sierras. Aloes from the Riviera have thriven so far, but I do not know their names. They were merely small plants that I dug up at Cap Ferrat and dumped into a sheltered corner to see what would happen. *Cordyline australis* and *C. indivisa* are shooting up, the latter about 14 feet now, but the former got a nasty check in the winter of 1927, being cut to the ground. However, they are recovering and I hope will face up to frosts all right in the future. *Drimys aromatica*, a cutting from the Rev. ARTHUR BOSCAWEN long ago, has done well, and we have several plants of it in different parts of the garden, for it is attractive in bloom and the stems make a nice piece of colour. *Pittosporum Tobira*, *P. Ralphii* and *P. Mayi* are making big plants, and the last-named is, of course, a standby for winter decoration.

Practically all the *Ericas* are happy, and such as *E. mediterranea* and *E. lusitanica* have to be cut back hard to keep them in bounds ;

and the same applies to the hardier kinds, which all form an excellent shelter for the rare species of duck we breed here.

I thoroughly enjoy the expression on the faces of my gardening friends when these little creatures first dawn upon them. Blank horror is registered, there is much head-shaking, shoulder-shrugging and—"Oh well, Ducks . . ." The rest is a silence far more eloquent than any spate of words could be. However, I have found that ducks and a garden are compatible, provided there is sufficient space for both. I do not say that at times there is not a little damage done—there is—but by no means sufficient to warrant the absence of the most decorative and amusing of birds. They have at Thorpe seven pools and ponds to range over, plenty of grass to sit on, and I supply many "Lidos" in the shape of logs just above water-level, where they sun themselves in gaily coloured rows. One very soon finds their trails from pond to pond, and as they stick to these it is merely a matter of not planting near them. They are rather chary, as a matter of fact, of treading on strange plants for fear of hurting their feet, which are extremely tender. If a site near their trail is needed for some particular planting, the best way is to run a carefully hidden piece of wire netting along the spot, or to stick some short sprays of Butcher's Broom round the plants. A few pricks from that soon teaches them to keep clear. I should hate to be without the Canvas-back, Carolinas, Mandarins, Teal of all kinds, Pintail, Widgeon and Pochard wandering from pond to pond, uttering their varied cries and affording one immense amusement with their idiosyncrasies. It is only in spring that once or twice there has been a raid on the Aubrietias, but now we counter that by providing them with old cabbage leaves and other kitchen-garden refuse which they love.

Among useful autumn plants in the lower garden *Ceratostigma plumbaginoides*, *C. Willmottianum*, and the rose-purple blooms of *Clerodendron foetidum* make a good combination and last well; so does the incense-scented *Eupatorium Weinmannianum*, with its polished foliage that is very welcome in the winter days. Hardy Fuchsias are another autumn treasure, while the variety 'Venus Victrix' remains in bloom till some really sharp frost comes along, and even then it takes no harm but shoots up gaily each spring. On the sunny top of the bank, where Colonel GAVIN JONES is working, *Teucrium fruticans* has spread into a fine bush with a group of *Kniphofia glaucescens*, whose foliage tones well with the *Teucrium*, and *Yucca filamentosa*, the whole thing set against a background of dark holly that grows on the other side of the bank. This combination ensures a long period of flower, beginning with the *Kniphofia* in early summer and ending with the *Teucrium*, still hanging on, with its pale mauve blooms, in late December. On the lower ground of the water garden *Watsonias* have done excellently, especially a beautiful one from Miss STANFORD (No. 2) that, as a yearling, threw a single spike of brilliant pillar-box scarlet flowers with purple stamens, and this, its second year, had ten spikes, and a very striking effect they made, but hard to place because

of the colour. Aristeas from South Africa are a success, and the vividness of the blue clusters, though each individual flower lasts but a day, makes it worth growing beside water. *Moraea spathacea* bloomed freely in 1932, and *Richardia africana* succeeds on the pond edge or in the water, provided in the first case that it is well top-dressed for the winter, and in the second that it is planted below freezing level. A few plants of *Richardia Elliotiana* accidentally got left out in the winter of 1931-2 and came through unprotected in a sunless spot, so they have now been transferred to a warmer corner just above water-level. But no plantings of Callas in this country can satisfy anybody who has seen them in Cape Province, stretching far and wide in the glorious but mosquito-haunted Knysna Forest, where they remain most vividly in my memory. *Phygelius aquaticus*—South Africa again—far surpasses *P. capensis*, for it does not become leggy, has lovely tubular terra-cotta flowers that last well in water, and is still in bloom in December, having begun to flower in July. Can one ask more of any plant? Near it grows a slender pale pink *Salvia*, from Sir LIONEL PHILLIPS' garden at Vergelegen in Cape Province, which I have not yet got named. Another plant, kindly named for me at Edinburgh, from the Belgian Congo, is *Brillantaisia Lamium*. Its great purple-blue flowers wear the infuriated expression of a retired Anglo-Indian colonel whose curry was not up to standard at the club. Though it is essentially a tender plant, it strikes so easily and makes such an effect, planted out in half shade near water, that it is well worth growing. I was in Canada when the seed came to me, and it was sown in the greenhouse, where it proceeded to germinate in three days! It certainly was in a hurry to enter this vale of woe.

Primula rosea, a specially fine strain given me by Mr. HANBURY, from Brockhurst, has made a brave show for many years on one pond edge, and is backed by a mass of pale pink Dieramas; while the deep wine-coloured Dierama from Kirstenbosch Gardens (unnamed by them) is grouped with *Iris chrysographes*. Several people have told me that these dark Dieramas do not come true from seed. This one has done so thus far, and it is a strikingly handsome plant. Tritonias have proved quite hardy for three years now in rock pockets, and are grand if carefully placed, but they are not to be trifled with because of their brilliant hue. *Anomatheca cruenta* has turned out a veritable gate-crasher among plants, for Mr. AMOS PERRY kindly gave me a few bulbs some years ago, and now it seeds everywhere and pops up regardless of how cruelly it clashes with its neighbours. Another thruster, though only in its own neighbourhood, is one of the Bobartias, also from Mr. PERRY. I never seem able to collect all the seedlings, no matter how carefully I hunt the bed over. This Bobartia also needs cautious placing, though it is not so violent in hue as Tritonias or Anomatheca. The Nerines are good and, of course, *Nerine Bowdenii* is hardy in many places. *N. sarniensis* is glorious, but inclined to bloom rather too late in the open. *Hacmanthus coccineus* flowered in a hot pocket of the rock garden for two years, and merely had a glass

sheet over it in the winter, with *Raoulia* carpeting the ground. *Pelargonium acetosum*, which I found in a ditch near Port Elizabeth, was much cosseted the first winter, but since we found that it sent out long runners yards away from all protection, it has been left to its own devices, but with it, as with practically all the foreigners, we take a handful of cuttings each autumn; it means very little trouble, and is worth the precaution, I think. *Selago serrata* has stood three winters with protection, and is an attractive little mauve-flowered plant. *Lachenalias* were moderately good but short on the stem. *Babianas* were maddening, throwing some meagre blooms and spending all their energies on producing innumerable bulblets underground. As that was not what I planted them for, I have transferred them to the greenhouse, where perhaps they may be more sensible.

To my mind the best things I brought back from South Africa were the *Oxalis*. How I laboured to get them! How hot I got, and how infuriated with the soft sand that trickled back into the hole I dug much faster than I could haul it out; and what miles down the bulbs grew, with their queer semi-transparent tubers for the storage of water in that dry land! Some of these *Oxalis* that I replanted this autumn had tubers as thick as my finger. So far they will persist in blooming at the worst time of year, late October and right through November, and as they are the most frail-looking little things, it passes one's understanding how they face such weather. Those I brought back are *Oxalis hirta*, *O. polyphylla*, *O. variabilis*, *O. purpurea*, and a few others that I could not find listed in MARLOTH'S book, nor has anybody given me their names so far, but I am hoping that Mr. BOWLES may do so another year. There is a particularly beautiful terra-cotta-brick-coloured *Oxalis* which comes on a long stem, while another with big leathery leaves has not yet flowered here. The golden *Oxalis lobata* from Chile makes a good contrast to the pinks and rose colours of its fellows, and *O. enneaphylla*, given me directly from the Falkland Islands by a neighbour, blooms well and has increased readily. *O. cernua*, brought from Cap Ferrat, flatly refuses to have any truck with me—why, I do not know, considering that its far more tender cousins thrive as they do. *Cyrtanthus O'Brienii*, *C. Mackenii* and *C. sanguineus* all stood up untouched to the sudden and very sharp frost of October 1931, and continued blooming after it when every *Dahlia* in the borders hung black and mournful. These *Cyrtanthus* seed quite freely, and are well worth a sheltered corner in the rock garden. *Crinum Powellii* is a plant that, here, dispenses with a wall, and is a lovely thing, coming as it does late in the season. *Schizostylis coccinea* is fine for late work, and makes a vivid splash of colour against *Olearia macrodonta*'s grey foliage, and was still, in mid-December, in full bloom. Unfortunately, the variety 'Mrs. Hegarty' absolutely declines my company, whilst my namesake, *Schizostylis* 'Lady Byng,' produces so far a forest of leaves but no flowers, which, in the circumstances, seems unfriendly. *Opuntias* from Medicine Hat, Alberta, and also a few from South Africa, give a good account of themselves, but the "Succulent Fever" has not affected me yet, because to my mind most of these



FIG. 27. THE STEWPOND WITH *SALIX* 'VITELLINA RAMULIS AUREIS.'

[To face p. 152.]



FIG. 28. — FOUNTAIN MADE FROM BASE OF OLD CHURCH SPIRE.

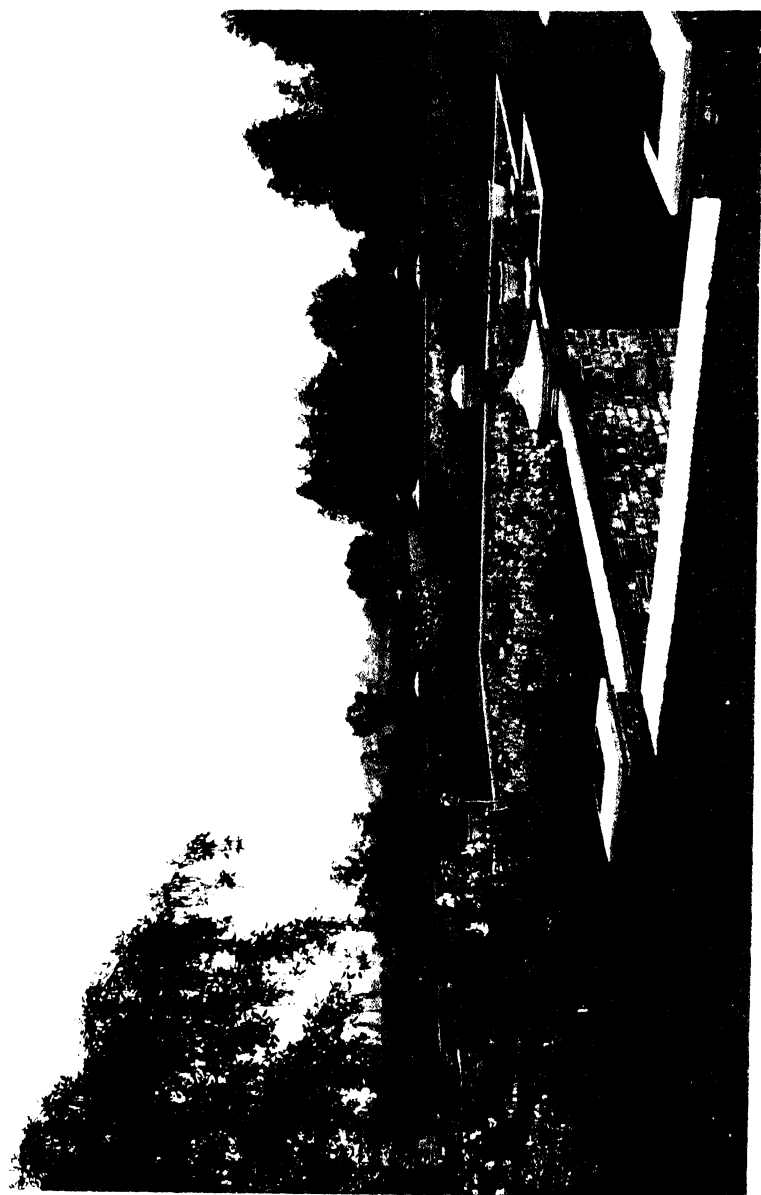


FIG. 29.---PART OF THE SUNK GARDEN AT THORPE HALL.



FIG. 30.—THE GARDEN FROM THE HOUSE, SHOWING POOL IN IRIS GARDEN AND THE LOWER WATER.

[To face p. 153.]

oddities are more suggestive of pathological specimens on a laboratory shelf than ornaments in a garden. Sir WILLIAM LAWRENCE and his fellow-Cacticians will snort loudly at such heresy.

Leading up through the woodland, at the east end of the old stew-pond, is a wide grass path, and when I came one battled a way up through almost impregnable laurels ; now when guests walk here they exclaim “ *What an ideal place to garden !* ” I know exactly what that remark implies : “ Why have you been such a fool as to neglect a patent opportunity ? ” But I have not been a neglectful fool—only a disappointed one, for on the left of the path there is an irreclaimable bog, of which so far I cannot locate the origin ; and on the right the ground is so impoverished and matted with beech roots that not a single plant will grow except Aconites and Daffodils in the spring ; after that it is waste of plants to put in anything. Some day I mean to tackle the soggy side and run the offending water to ground. Leading up to this disappointing piece of garden is a thicket of *Rhododendron ponticum* beside the pond edge, where I have massed the *Lilium giganteum* that Mr. SCRASE DICKINS gave me, together with a tall, pale pink Japanese Anemone that I have had for so long that its name is lost in obscurity. Colchicums have their place here, and Crown Imperials, with a groundwork of *Tiarella cordifolia* from dear Miss JEKYLL's lovely woodland, while *Cyclamen europaeum*, *C. neapolitanum*, and *C. ibericum roseum* have their special corner where they sit with their neatly arranged marbled leaves spread out round the flowers like the fluffy layers of a ballerina's skirt as she sweeps to the ground in a final curtsy. Cyclamen are queer plants, and I well remember my dear old father, who was a keen gardener, struggling to grow these attractive plants. Nothing would induce them to live, though he gave them everything they were supposed to want, lavishing time and trouble on them ; and here they just seed all over the place, coming up in the gravel edges of the paths far away from the parent plant. It was the same with that delightful little Winter Aconite. Vainly did the poor old man struggle with it, only to fail, whilst here it seeds freely, and I often wish he were alive to enjoy the golden carpet in early spring.

Beyond the Cyclamen the ground dips to a wet hollow filled with all our best flame, shrimp, rose and salmon coloured hybrid Primulas from the natural crosses that have originated here between *P. japonica*, *P. pulverulenta* (which I have now discarded), and *P. Bulleyana*. They make a fine splash of colour, and I have tried, this autumn, drifting young plants of *Meconopsis betonicifolia* through them to see what the effect will be of this combination lightened by young plants of *Adiantum pedatum* that I hope will be as successful as the original one I sent over from Canada years ago, and which now produces 16-inch fronds and has given me a batch of seedlings, in the dense shade among crevices of the rocks. The Ostrich Feather Fern is an effective shelter and companion for Cyripediums, which are planted on the edge of the pond in this woodland corner, for it is light and a good height for the Cyripediums to show amongst. *C. spectabile*, *C. pubescens*, and *C. candidum*

are all up here, from Canada, and I find that the best way of treating them is to dig out the soil to a depth of two feet on the water's edge, fill the hollow with rotten wood, leaf-soil, sand, and any good peat mixture, plant them firmly and cover them with the same mixture, plus a top-dressing of pine needles. One has then given them exactly the conditions they get at home, and the result has been excellent. This year for the first time I have succeeded, thanks to an American friend, in getting the rare *C. arietinum* or Ram's Head Lady's Slipper from the north of Quebec Province. It is more queer than beautiful, but an interesting plant that is very rare in English gardens. Also once more—and for the last time if it now fails—I have a new planting of *Calypto borealis*. Mr. WALLACE once sent me some that a friend had given him because she could not "do" it; nor could he, so here it came, only to die. This time my stock comes direct from Western Canada, admirably sent in the Sphagnum it was growing in, and to this I added a foundation of rotten oak wood and left the whole thing in the case it had travelled across the Atlantic in till, a short time ago, I repeated my orchid mixture and, carefully lifting the whole wad of moss and plants—rather like a huge mustard poultice in consistency—dumped it down on the mixture in a shady, moist spot, telling it that this was my last attempt. My plan of rotten wood had evidently been welcome, for I saw one small bulblet growing right through a piece of the old oak wood we had put under it. So I hope—but rather uncertainly—for good results. The Calopogons have had me completely beaten—lovely things that one sees in so many places in the Canadian swamps, and which I have brought over and sent over, only to die, alas! The same applies to *Epigaea repens*, and to *Saracenia purpurea*, which succeeded for two years after I returned from Canada, then died; but I am trying it again, this time in the orchid mixture and giving it the shelter of a piece of glass, for, though perfectly hardy out there, I believe the damp English winter is what it resents, as do so many Canadian and other foreign plants.

On the opposite bank of the pond, with a full south aspect sheltered from all bad weather, I am with great temerity trying out three Camphor trees (*Cinnamomum Camphora*), but as they arrived from California only a short time ago, what they will say to British conditions, even with shelter, I do not know. They are so beautiful that I couldn't resist trying them after seeing the 300-year-old giants at Vergelegen, where they had been planted by Governor van der Stell somewhere in the seventeenth century. Here, too, are groups of Eucalyptus trees, *E. rudis*, *E. pulverulenta*, *E. urnigera*, *E. Deanii*, *E. robusta*, *E. Gunnii*, *E. coccifera*, *E. amygdalina* and *E. whittinghamensis*, in order to see which will prove hardy. They have all had several winters out, and the chief trouble is the rapidity with which they make growth and, like gawky schoolboys for ever outgrowing their trousers, these trees are for ever outgrowing the tallest stakes we can give them, and then they "whip" most alarmingly in the East Anglian gales. If we can only keep them upright till they are old enough to stand on their own, I believe several will prove hardy, and certainly, being evergreen, they

are a welcome addition to a garden in winter. *Tricuspidaria lanceolata* up at this end of the place has made good growth now, though this is my third attempt with it. *Embothrium coccineum* has at last decided to grow, and so have some plants of *Desfontainea spinosa*, which were rather miserable specimens sent me two years ago.

Along the terrace on the south-west side of the house *Callistemon rigidus*, *C. salignus* and *C. lanceolatus*, from seeds sown in 1924, have done well and are respectively 6 feet and 5 feet 6 inches in height, covered with bloom each summer. *Sollya heterophylla* rambles through Rose 'Mermaid's' protective thorns, two myrtles are always smothered in bloom, and the other Rose—now out of commerce—'Dr. Rouges' is a good and steady bloomer. *Fremontia mexicana* and *F. californica* are on the young side, against a newly built wall, while *Cytisus glaucus* is useful and produces fragrant blooms nearly the whole year round, but is apt to become leggy unless cut back hard. *Berberidopsis corallina* is happy, also *Bignonia grandiflora*. A Citrus, of which Mr. BOWLES gave me some cuttings but no name long ago, has made nice plants, but so far has not bloomed. *Cassia corymbosa* in 1932 elected to flower throughout November—why, I do not know. A huge old *Clanthus puniceus* has formed itself into a tent stretching from the kitchen-garden wall across the roof of the mushroom house, and gets a piece of Windolite laid over it in winter, for which it returns thanks by producing a brilliant mass of crimson lobster-claw blooms that last well through June. Camellias are of more recent introduction here, but seem happy and are well set with bud for next season.

A should-be hardy plant that has given me much trouble is *Arbutus Menziesii*. In Vancouver Island the whole of the Malahat Pass is clothed with these Madrones and *Cornus Nuttallii* above a carpeting of golden Broom—a dream of loveliness. But at Thorpe the shrub has given me a lot of bother to establish, which is the more strange since *A. Unedo* thrives and seeds itself, and the following tale, though hardly credible, is true nevertheless. When I set to work on the gargantuan hedge by the stewpond I found in it an old battered *A. Unedo* so throttled and crippled that there was nothing for it but to clear it away with the rest of the rubbish. It was cut down, stubbed out, and as this was in 1915 when labour was scarce it was merely rolled down the adjacent bank above the water garden and left there. It looked so forlorn, with its jagged stumps sticking up, that the next spring I flung a few *Tropeaeolum canariensis* seeds beside it, just to cover the melancholy sight, and at the end of that summer I was surprised to see a green shoot breaking up near the ground. I thought it a dying effort; but not so—it meant to live, and now it remains, where it fell, but well earthed up and cared for, having made a bush 18 feet high by 30 feet in circumference, annually loaded with flowers and fruit. This from a plant notoriously intolerant, even under the most favourable conditions, of a move!

Many years ago Mr. BOWLES gave me a piece of *Iris Wattii* from his conservatory, and this has succeeded under my sitting-room window in a hot and hopelessly dry spot. *I. japonica*, from the same source,

does well in various parts of the garden, but I find it is grateful for a little shade and moisture, as then the foliage retains a far better colour than if it gets a scorching. *I. japonica* \times *Wattii* of Mr. BOWLES is an attractive thing. I often wonder how many plants I owe to that most generous of gardeners, and I fully endorse his dictum that it is wise to give of a rare plant, because this form of bread upon the waters is the best means of ensuring the perpetuation of a treasure. *Lobelia cardinalis* from Canada is an uncertain plant, and I box a few crowns each autumn, because I have never seen the real thing here, and one is always offered a plant with red leaves, whereas the genuine article has green. *Primula Florindae* is a thing some gardeners affect to scorn, but I cannot believe that anybody who has seen the great ditchful at Wisley in bloom can neglect it. Properly grown, with its head in the sun and its toes in the wet, it is a grand early autumn flower, especially if associated with *Parochetus communis* or *Artemisia* as a background. A good spring planting, that came by chance, is *Primula japonica* of a particularly deep crimson, with *Scilla nutans* and, dribbling about among it under a Weeping Willow, the parasite *Lathraea clandestina*. The latter took some trouble to establish, but now has run all over the place under the lower water-garden Willow, and is coming up among the roots of *Primula japonica* as though it found that a good foster-mother. *Epipactis gigantea*, a more curious than showy plant, always attracts attention, and there is no doubt of its hardiness, though I only found it in one place in Canada, beside some hot springs in Lake Windermere district, where it rioted among *Adiantum pedatum* and another dwarf *Adiantum* which I failed to get home, and whose name I did not know. *Calla palustris* I cannot induce to grow so far, and I wish I could find the reason for its obduracy, since one sees it by the acre in Canadian pools and streams. In a moist, half-shady corner many species of *Serapias*, *Ophrys* and *Orchis* from the Riviera seem happy and are increasing. *Habenaria fimbriata* is charming with its orchid-coloured blooms on tall stems. 'Jack in the Pulpit' (*Arisaema triphyllum*) is an interesting plant, though I have never got mine more than about 14 inches, whereas in Canada they attain to 2 feet or more in damp and shade. *Saxifraga Fortunei* is another shade-lover, besides making a good forcing plant in winter, and it lives with the more tender *Primulas* from Mr. MILLARD, Dr. STOKER, Mr. ANDERSON, and other treasures from my good neighbour Dr. GIUSEPPI.

Next summer I am looking forward to planting up some of the nooks in Colonel GAVIN JONES' rock garden with the dwarf Californian annuals. And here I know I am striking an awful snag, because to many people annuals in a rock garden are taboo. But why, provided they are the right sort of plants? Where else, for instance, can you grow to advantage such dwarfs as the *Baerias*, *Platystemons*, *Coreopsis Douglasii* (only 6 inches high), *Orthocarpus purpurascens* (4 inches), *Lupinus nanus*, *Felicia Bergeriana*, Swan River Daisy, a certain dwarf mauve trailing Mallow with minute flowers that I collected in California, but of which I have not got the name, and a host of other things as well? Surely these little carpeters are the very things to cover bare



FIG. 31. —THE STEWYOND AT THORPE HALL.

[To face p. 156.]



FIG. 32.—VIEW FROM THE HOUSE ACROSS THE STEWPOND.

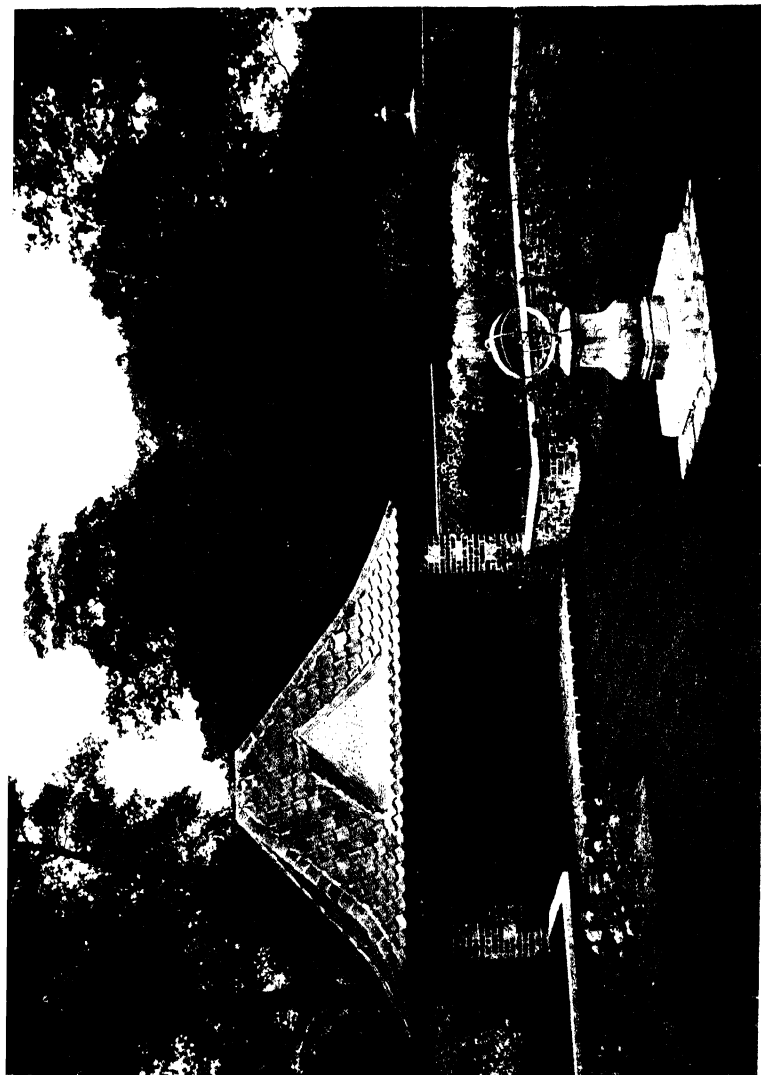


FIG. 33.—SUMMER HOUSE AT N.E. END OF SUNK GARDEN. LOUIS XIV SUNDIAL IN FOREGROUND.



FIG. 34.—LATE SUMMER AND AUTUMN FLOWERS AT THORPE HALL.

[To face p. 157.]

spaces in the rock garden where earlier stuff, such as *Tulipa dasystemon* and the like, is past? Colour is better than earth, and especially in the rock garden, where many of the plants are over early. So I shall always be among those sinners who plant certain annuals there, *pace* the pundits.

Of perennial plants which I brought home either as seeds or seedlings last spring from Pasadena and the neighbouring country are the Eriogonums, but how many of them will prove hardy I do not yet know. *E. rubescens* is a lovely thing if it survives. *E. compositum* I have had for years and find it attractive, also *E. subalpinum* from Canada. But to return to California, I think the loveliest of all the plants I saw there, and which I am trying out, is *Gilia californica*. It was a straggly bush on the sierras, nearly 2 feet in height, and smothered with the pale rose flowers that look too thin to exist at all; I do not know if it is hardy, and I doubt it. From San Diego comes *Coreopsis maritima* that delighted everybody except Sir WILLIAM LAWRENCE, who treated it with a contumely that it by no means deserves, for it has vivid golden-yellow blooms some 4 inches across, the lower bracts standing out like an Elizabethan ruff, the foliage a vivid green, cut into narrow lobes. It flowered from spring till December, being admirable for cutting and, I should think, reasonably hardy. Nobody, whether layman or professional, seemed to know it. Mr. GLOVER, Ryders' managing director, having heard of it from Mr. AMOS PERRY, came to see it; Mr. BALFOUR of Sutton's did not know it: so it remains a mystery as to whether it is the commoner Sir WILLIAM avers, or a novelty. Anyhow it is well worth growing, and will certainly keep a place in my borders. *Eschscholzia maritima*, from the sand dunes near Santa Barbara, is another lovely thing with silver-grey foliage and big lemon-yellow flowers showing an ochre-coloured spot in the centre. The Abronias were good, also *Oenothera ovata* that, along the dusty Californian highways, reminded one of big patches of primroses. *Antirrhinum speciosum*, with small, bright red blooms, came into bloom a little late, but we have lifted the plants and taken cuttings, so hope to keep it.

From the Comber Expedition I had some seeds given me, and we are trying out several shrubs, notably *Veronica nivea*, with the habit and appearance of *Erica carnea*; several Olearias; *Melaleuca squamea* and *M. squarrosa*; also *Vellya paradoxa*, of which, alas! I have only a single plant, and that simpleton, of course, has let me down by producing neither seeds nor cuttings. *Goodenia geniculata* was a perfect lady and gave me a dozen nice cuttings. From Mrs. TATTERSFIELD in New Zealand I got Dianellas, *D. tasmanica* and *D. coerulea*; but Celmisias are still considering their line of action—tiresome but lovely plants. Among quite hardy but sometimes a trifle difficult plants are *Viola pedata* and *V. pedata bicolor*. They were so much more Violet than Viola in their blooms that I made the mistake originally of giving them a certain amount of shade, to which they promptly showed their objection by wilting, whereas those in hot, dry spots flourished and seeded happily, especially *pedata*. The Gum Cistus family, *Cistus algarvensis*,

C. cyprius, *C. laurifolius*, *C. florentinus*, *C. purpureus*, *C. crispus* and the lovely 'Silver Pink,' are all happy, and *Leptospermum Nairnii*, which gets nothing but a top-dressing in winter. *Beschorneria yuccoides*, a Mexican, of which Mr. ANDERSON gave me a seedling, has developed from the one crown into a big clump, and gets its own protection from the rocks round its base. The lovely little *Stylidium graminifolium* bloomed well in the summer, but has a pernicious habit of damping off at the crown, though fortunately it will re-form another and grow on undisturbed. *Helipterum anthemoides* is a tallish, slender everlasting. *Diplarrhena Moraea* we have had four years now, thanks to Mr. MILLARD's generosity; it is, I believe, a Tasmanian. *Polygala virgata*, a South African shrub with purple pea-flowers, likes a sheltered and sunny spot, and needs a little protection. *Calceolaria violacea* is an old standby against the kitchen-garden wall, and makes a good pot plant as well. One of the most trying little creatures is the Canadian *Sphaeralcea coccinea* from the prairies, but which I never succeeded in getting home, for it has unending roots, and the seeds were never ripe when I was out West; so I had given it up in despair, and of course, just because it was not procurable, woman-like I wanted it all the more. Quite suddenly in 1927 up came a plant among the *Opuntias*! Evidently there had been a dormant seed tucked away somewhere in the roots of that prickly person. Not only did it come up but it increased and multiplied—only, however, in that single spot; and when Mr. HAY was with me he wanted a cutting. Could we get one? No, nor would it ripen seed; so we tried layering it in a pot this summer, but again nothing happened, and Mr. HAY has not yet, I am sorry to say, got his plant, for he has been most kind to me, and I feel ashamed of failing him. However, last spring in Calgary I poured forth my woes to Mr. READER, the able civic gardener of that town, and he has sent me seed. Will it germinate? This plant has puzzled me by its contrariness, because it carpets the prairies for miles and is a complete weed there, so why such coyness here?

I feel these notes are degenerating into a bare list of names, like a nurseryman's catalogue, which is the invariable trap when one starts to write about a garden. So I will return to the actual garden-making that has taken place since 1926. Having completed the layout and shrub planting in the water garden, I had perforce to turn my attention to the west and south of the house. I did not like it a bit. The soil was hot, greedy gravel, the two-way slope maddening to deal with, and the site formless with laurel clumps, some moribund trees, and an unaccountable mound humping itself beside the triangular pond and crowned by a queerly dwarfed old oak. On clearing this unpromising piece of ground we found the mound was formed by the earth dug from the foundations for the present ugly Georgian house, and it had been dumped right in front of the drawing-room windows! There was much clearing and cleaning to be done. The pond's prim triangle was altered, its level raised, whereby we had to sacrifice the original *Eucalyptus Globulus*, but as they had been badly neglected in the past and had a young family planted out on the stewpond side, it was of no great

consequence, though I had a sentimental affection for those old warriors. A gully ran from the pond towards the kitchen garden and garage, where brambles and nettles thrived galore, and when these were cleared and a gentle slope created bounded by a low wall of old red bricks, it afforded a place for shrubs, backed by a small belt of fir trees as shelter. The two-way slope westwards rather harassed me, as I am bad at coping with levels, so I decided to call in a "landscape architect" for the first time. He came, but with such grandiose ideas of "sweeping away this" and "completely altering that" in other parts of the garden as well as the portion he had been called in to discuss, that I began to suspect his big estimate plus "extras" of all kinds was merely the overture to the full score of his proposed operatic performance, so I bought the plans as they stood and carried out the job myself. I only used a small proportion of the original design, working it out on a far bigger scale and at less cost than originally suggested. The great thing was that in 1929 I had the money to spend, there was unemployment to be met, and so for once duty and pleasure marched hand in hand, and the sunk garden that resulted gave fifteen men work for six months, so all were pleased. I will not enlarge on this because the pictures speak for themselves better than I can do. One thing which does not show is the old Essex form of decoration inside the summer-house, accomplished by one of the workmen entirely from his own ideas. The method is to draw on the wet plaster with a pointed stick, and the result was really quite good, and an interesting example of well-nigh a lost art down here. At one end of the sunk garden is this big summer-house, at the other a dumb well, from which we do the watering—a much-needed attention in our hot, dry summers. The garden consists of two levels, the one at the foot of the steps and another, down four more steps, where there are semicircular Rose beds. In the centre of one of the Rose gardens is an old Louis XIV sundial that belonged to my father, and in the other a charming wide stone basin that the Thorpe ex-Service men gave us as a silver-wedding present, and which we naturally prize immensely. Unfortunately, though we live in a Rose-growing county, Roses are one of our weak points, and I find it hard to choose varieties that will thrive at Thorpe. For instance, a really good golden-yellow that is healthy, free, and above all fragrant—that main essential in a Rose—I find hard to get. However, if Roses do not come up to the standard of excellence that I desire they certainly last well into the winter, and unless anything unforeseen occurs I always reckon, when at home, on picking a good handful or more on Christmas Day. The upper level of this sunk garden is devoted to wide herbaceous borders backed by 4 feet 6 inch walls of old red brick, and the plants here are entirely for late summer and autumn use, Asters, Chrysanthemums, Rudbeckias, Dahlias, Golden-rod, Lilies and Montbretias, with the relieving white of *Hyacinthus candicans*, and in the moist end, near the dumb well, where there is a seepage, Kniphofias and *Hydrangea hortensis*, that in this spot come blue of their own accord. Curiously enough, they do the same in the horseshoe wood sog—an intense and almost too vivid blue.

The central ornament of the upper level has an unusual origin. When this garden was in the making a man I knew sent me a photograph of some masonry with time-worn gargoyles and well-smoothed edges, which he said was the base of a church spire in the Harrow Road at that time being demolished. It was exactly what I wanted to form a big fountain with a figure in the centre, so I had it sent down. Then the fun began. By no means could we reconstruct the thing, and it lay about on the ground like a monster jigsaw puzzle till the original purchaser put me in touch with the steeplejack who had dismantled it, and he solved our problem; so there it stands, looking as though it had been in its present site since the early days to which Thorpe dates back. Beyond this formal piece of garden the ground has been allowed to retain its two-way slope to another pool, whence a "trinkle," as they say in Essex, runs down to the Long Water, which is supplied from the overflows of the stewpond and water garden, all on the higher level and also by various springs that come from the little park which surrounds the place. It was in digging out the Long Water that we came on a place where clay had been dug and burnt for the bricks of the Tudor building of which, alas! nothing remains except broken tiles that we find in this part of the place, and the foundation of an old wall buried deeply under the soil.

The two-way slope is a half-finished Iris garden, broken up with flowering shrubs and groups of Conifers that will in time, I hope, cut the gales that sweep across the rolling country beyond our boundaries. But this side of the garden is still unfinished, because we have been forced to go abroad for three winters now, at the very time when construction work should have been in full blast. However, I am hoping next autumn to tackle this conundrum and get it straightened out satisfactorily.

So here, for the moment, my garden stands, full of flaws—being, as you see, purely a home-made affair—flaws some of which I have seen for myself, others that friends have pointed out, and I hope to remedy. But the years fly apace, I am getting old, and there is not the money to employ a posse of extra labour as in 1929, alas! so it has to go slowly. Still the joy is to go on tinkering with the garden and rejoice that it has brought me such countless friends the world over, to whom I owe an immense debt of gratitude for plants, seeds, and kindly interest, since, to alter one word of a well-known line:

"One touch of gardening makes the whole world kin."

It is the only occupation or profession I know of in which layman and professional meet on a common ground, in a common cause, and are willing, almost always, to help one another. For this reason let us hope that the Britisher's interest in his garden will never wholly wane, in spite of disappointments, misfortunes, and the crippling taxation that baulks him at every turn.

TRIALS OF HARDY FRUITS FOR COMMERCIAL PURPOSES :
STRAWBERRIES AT WISLEY.

By A. N. RAWES, Fruit Experiments Offices.

IN the report in the R.H.S. JOURNAL, 57, p. 246, upon the testing of varieties of fruit for commercial purposes, details of the trials of Strawberries were not included.

Since the commencement of the trials 51 varieties or alleged varieties of Strawberries have been received for testing. Many of these have now been eliminated as unsuitable for wide commercial planting. In addition to the varieties undergoing trial, the Society maintains in the fruit plantations at Wisley a representative collection of varieties for comparison with material being tested, and to determine questions of synonymy that may, and frequently do, arise. It is interesting to note that during the last twelve years Strawberries under ninety different names have been grown at Wisley, but, as was only to be expected, many instances of synonymy were discovered, and the collection now totals 52 varieties. This will be added to as suitable healthy stocks of other varieties are obtained.

The trial plants are grown between rows of young apple trees in the Deers Farm Orchard, one hundred plants of each variety constituting the test. Usually two or more beds of one hundred plants are grown, over a period of years. The procedure is that the stock received from the raiser or introducer is planted in temporary quarters, and, after a season, material from selected plants is propagated to establish the trial beds. Not infrequently the stock of plants received is unhealthy and weak, and as much as three seasons of careful selection and cultivation may be required to establish a sufficiently robust and even stock of plants to permit comparable and satisfactory trial to be made. When propagating material from original stock for the trial plantings, it is the invariable practice to retain not more than five runners to each plant, and to allow only one young plant (the first formed) to develop on each runner. Plants lacking vigour, or at all unhealthy, are discarded periodically.

The varieties originally chosen as the standard with which the performance and character of new varieties are compared were 'Royal Sovereign,' 'Sir Joseph Paxton,' and 'Givon's Late Prolific.' The last-named is now discarded as a standard variety, since efforts to obtain a satisfactory condition of health, vigour, and fertility in the plants available have so far failed. At the commencement difficulty was experienced in obtaining stocks of 'Royal Sovereign' and, in a lesser degree, of 'Sir Joseph Paxton,' suitable for the purpose. It is evident that with these, and other varieties, there exist definite "strains" of the variety which, while resembling one another in vegetative

characters, show marked differences in vigour and cropping. With 'Royal Sovereign' five strains were obtained from widely different sources and grown alongside one another, and, although it appears that some degree of uniformity in vigour and cropping of different stocks may be obtained by continued selection over several years, certain of the strains growing under the conditions at Wisley respond to treatment much more readily than do others. From results obtained over several years with most varieties it seems evident that when methods of selective propagation and the annual elimination of weak and unhealthy plants are neglected, the stock rapidly deteriorates in vigour and cropping. Other varieties in which we have found marked difference of behaviour between "strains" are 'Vicomtesse Héricart de Thury,' 'Leader,' 'The Duke,' and 'The Laxton.'

In the progress of the trials, many instances of synonymy among varieties have been confirmed, as the following :

DEUTSCH EVERN	syn.	{ Tuckswood Early. Early Evern. Rufus.
ROYAL SOVEREIGN	„	King George V.
LEADER	„	Kentish Favourite.
VICOMTESSE HÉRICART DE	}	{ Stirling Castle. Garibaldi.
THURY		
JUCUNDA	„	Amazone.
MADAME KOOI	„	Princess Juliana.

It has also been found that the varieties 'McMahon' and 'Lord Overton,' while distinct from 'Givon's Late Prolific,' often masquerade under that name.

The material under trial has been inspected by appointed judges each season, and as yet only two varieties have been recommended for extended trial at the sub-stations established over the country. These are 'Oberschlesien' and 'Tardive de Leopold.'

Oberschlesien possesses the desirable characters of vigorous growth, robust constitution, and great fertility, but lacks the quality of the standard varieties. There have been, and possibly still are, mixed stocks of this variety in circulation, and in some instances the rogue has predominated over the type. As is well known, careful attention has been given to the rogueing of stocks by Inspectors of the Ministry of Agriculture, as well as by growers generally, and the stocks certificated annually by the Ministry of Agriculture may be regarded as representing the true type.

Tardive de Leopold ripens a little later than 'Oberschlesien,' and is a vigorous grower and heavy cropper under most conditions. The blossoms produce pollen sparsely, however, and it is generally considered that best results are obtained only when it is grown alongside another variety, so that blossoms may be cross-pollinated by hive bees and wild insects. No critical experiments have been conducted

at Wisley to determine the degree of sterility or fertility of the variety, but it has been observed that plants in a small bed some distance from other varieties have produced a large proportion of irregularly-developed berries with hard green ends.

These two Continental varieties are now extensively planted in the strawberry-growing areas, but the inferior quality of the fruits, as compared with the standard varieties 'Royal Sovereign' and 'Sir Joseph Paxton,' precludes unqualified recommendation being made. Descriptions of these varieties and others are appended.

No definite opinion of the commercial value of other varieties at present under trial has yet been formed, and any real comparison of their commercial worth must be withheld until the plants have undergone further trial and the decision of the official judges is recorded.

Royal Sovereign remains the best of the early-ripening varieties, followed by *Oberschlesien* and *Sir Joseph Paxton*, with *Tardive de Leopold* as the best of the late Strawberries. Endeavour is being made to improve the stock of *Waterloo*. This is a late variety which has been popular with the amateur for many years, but stocks have deteriorated very considerably. The very dark colouring of the berries of *Waterloo* detracts from their value as a commercial sample, but the quality of the fruit is surpassed by few. Of the newer varieties under trial, *Gaddesden*, only recently introduced, promises to become a valuable early Strawberry for market growers. It is similar in many respects to 'Royal Sovereign,' the bulk of the berries ripening a little after that variety, and the plants are rather more vigorous than the present-day stocks of 'Royal Sovereign.' The appearance and quality of the fruit are excellent, and further trial may show that the variety is a valuable addition to the list of Strawberries for commercial planting and garden cultivation.

Shamblehurst Monarch, a new variety, promised well in the first few seasons; but this promise has not been maintained. A fault is the abnormal and irregular form of the large berries, varying from cockscomb to wedge-shape. The plants have grown well, and cropped freely, but the bulk of the fruit does not provide a good commercial sample.

Avant Tout is the earliest Strawberry to ripen in the trials, the berries being gathered in most seasons a full week before the fruit of the *Royal Sovereign* is fully coloured. Unfortunately the smallness of the berries and the light crops carried on the rather small plants render the variety unsuitable for general commercial planting.

Deutsch Evern is another early variety, the berries ripening a little before 'Royal Sovereign.' Given good cultivation this variety crops reasonably well, but the small plants are unlikely to produce the weight of fruit to the acre of certain other varieties. Its value lies entirely in its earliness, and the medium to small, conical berries are suitable for preserving whole.

Two seedlings received for trial from the John Innes Horticultural Institute, Merton, viz. *Richardson's Seedling* and *Seedling D 2*, both make small, flat plants and produce small, conical, and remarkably sweet berries. These varieties lack the constitution and cropping capacity required for commercial growing. *Flandern* and *Lord Grenfell* are varieties that have grown well and cropped heavily, but both lack quality and appearance, while the variety *Mrs. Stonor* lacks constitution and vigour and has consistently carried very light crops over several years. Other varieties that have been tested are *The Winn*, *Winsome*, *Aberdeen Favourite*, *The Friih*, *Duchess of York*, and *Phenomenal*, but none has shown characters which warrant recommendation for wide commercial planting.

The variety *Brenda* has not yet received sufficient trial to enable a definite opinion to be formed. The plants grow remarkably strongly, and in the first summer after autumn-planting cropped satisfactorily, but the berries lacked the bright colouring, firmness of flesh, and quality that are desirable.

Various seedlings are now undergoing trial, including nine selected from a batch raised by Mr. M. B. CRANE at the John Innes Horticultural Institution, Merton, and two seedlings from Mr. GLENNY of Spalding. Their behaviour and that of other new varieties only recently established in the trials will be discussed in a later report.

Several varieties of Strawberries have been sent to the Fruit Preservation Research Station at Campden, to test their qualities for canning. So far, the reports received show that 'Sir Joseph Paxton' is outstandingly the best. The variety 'Deutsch Evern' is reported as not altogether suitable for canning, being considered rather soft, and poor in flavour, and it was found that 'Shamblehurst Monarch' and 'Madame Lefebvre' were difficult to plug, and lacking in other desirable characters. The varieties 'Or du Rhin' and 'Aberdeen Standard' were reported upon favourably, and preliminary tests with 'Brenda' are promising. Both 'Oberschlesien' and 'Tardive de Leopold' appear suitable, but are not completely satisfactory.

* * * * *

Commercial growers and amateur gardeners alike are finding it much more difficult to maintain their Strawberries in healthy, fruitful condition than was the case some years ago.

This may be because diseases and pests are more widespread and prevalent than before, but it seems also that cultural methods and indiscriminate propagation may be blamed. At Wisley we have experienced the usual difficulties in obtaining healthy stocks of many old varieties, and these have been overcome to a large extent by adopting the following measures as part of normal routine cultivation:

- (1) Weak and unhealthy plants are grubbed and destroyed every year.
- (2) Stocks of the best plants are improved by selective propagation each year. No more than five runners are allowed to form

on each plant, and each runner is limited to one young plant, the first formed.

- (3) All the Strawberries are sprayed, towards the end of March each year, with lime sulphur at 3 per cent. strength, and in special cases this is repeated as soon as the fruit is gathered.
- (4) After fruiting, old foliage is removed and the plants sprayed or dusted with sulphur.
- (5) The beds are mulched with farmyard manure or old leaf soil, etc., after fruiting in late summer, and in spring receive a dressing of superphosphate at the rate of about 6 oz. to each square yard, with applications of potash as seems necessary.

We find this enables us to maintain healthy, fruitful stocks of most varieties and provides reasonably satisfactory control over such pests as the Tarsonemid Mite, Red Spider, and Strawberry Aphis, which are possibly the causes, direct or indirect, of the prevalent disease or diseases which fall under the heading of the Red Plant, Small Leaf, etc.

STRAWBERRIES.

ABERDEEN FAVOURITE.

Plant medium to large, vigorous, moderately spreading.

Leaves large, rugose, thick, dark green. Leaflets little overlapping, serrate to crenate. Upper surface glabrous, shining. Lower surface pubescent, pale green. Petiole medium length, thick; pale green; many hairs, semi-appressed, sloping away from blade; channel deep, wide, pronounced, pale green.

Runners many, moderately vigorous, green, tinged pale red; many short, semi-appressed hairs pointing from parent.

Blossoms medium size, perfect, white. Petals rarely overlapping. Trusses held out, not protruding beyond foliage, lax. Peduncle short, many hairs sloping to flowers. Pedicel usually very long, of medium thickness, erect, drooping after petals fall; pubescent, hairs sloping towards blossom.

Fruit small to medium, regular, round, blunt, pale red to scarlet, many hairs. Seeds not prominent on surface, little embedded, numerous, red; pistils persisting. Flesh rather soft, little juicy, red, colour suffused. Core long and narrow, cavity medium size. Flavour little sweet; quality fair. Mid-season. Fertility moderate.

AVANT TOUT.

Of French origin, particulars unknown. Sent for trial by A. P. Grenfell, Bridgwater, in 1928.

Plant medium or rather small, moderately vigorous.

Leaves medium, slightly rugose, thin, deep bright green. Leaflets not overlapping, ciliate, finely serrate to crenate. Upper surface glabrous, shining, convex. Lower surface dull, pale green, little pubescent. Petiole medium length, moderately thick; pale green-yellow, tinged pink; often bent or twisted near the top; many long hairs erect on surface; channel not pronounced, wide, shallow.

Runners many, vigorous, tinged light red, many short hairs standing out.

Blossoms medium, white, perfect. Trusses held out, not protruding beyond foliage. Peduncle medium, stout, pubescent, hairs erect on surface. Pedicel slender, hairs erect on surface.

Fruit small, round or bluntly conical, scarlet; many hairs. Seeds not prominent, embedded, numerous, dark. Calyx away from berry; sepals broad, long, downy, rarely recurved at tip. Flesh firm, moderately juicy, red, pale towards centre. Core moderately long and broad; cavity rather large. Flavour sweet to sub-acid; quality fair. Early; before 'Royal Sovereign.' Fertility moderate.

BEDFORD CHAMPION (fig. 35).

Raised by Messrs. Laxton of Bedford in 1894. Parentage 'Scarlet Queen' × 'John Ruskin,' crossed with a seedling from 'Noble' × 'Sir Joseph Paxton.' Introduced by Messrs. Laxton about 1904.

Plant moderately large, vigorous, spreading, flat.

Leaves large, shining, dark green, leathery, flat. Leaflets overlapping, ciliate, coarsely serrate-crenate. Upper surface concave or flat, shining, dark green, little pubescent. Lower surface dull, little pubescent, pale grey-green. Petiole short, thick; pale yellowish-green hairs; mostly erect, sometimes semi-appressed towards leaf; channel narrow, little pronounced, pale green.

Runners many, vigorous, reddish; many short semi-appressed hairs pointing from parent.

Blossoms medium to large, perfect, creamy white. Petals with wavy edges. Trusses semi-erect, not protruding beyond leaves, medium size. Peduncle moderately long, pubescent; hairs sloping towards fruit. Pedicels long, moderately stout, semi-erect.

Fruit large, roundish-conical, bright red, nearly glabrous. Seeds numerous, small, dark, little embedded. Calyx semi-erect, spreading; sepals of medium length, rather narrow, hairy. Flesh pale, soft. Core medium size. Flavour fair; quality fair. Mid-season. Fertility good.

BRENDA.

A chance seedling, parentage unknown. Sent for trial by H. J. Gautrey, Cottenham, Cambridge, 1931.

Plant large, spreading, flat, very vigorous.

Leaves very large, rugose, thick, leathery; very dark green. Leaflets overlapping, deeply coarsely crenate, sometimes bi-crenate. Upper surface glabrous, little convex. Lower surface pubescent, pale bluish green. Petiole medium to long, stout; pale green; hairs many, long, erect; channel deep, medium width, pronounced, green.

Runners not numerous, vigorous, red tinged and pale green on underside; many short erect hairs.

Blossoms large, white, perfect. Petals overlapping; sepals visible from above. Trusses held down, not protruding beyond foliage, lax. Peduncle short, stout; hairs many, erect on surface, a little reflexed. Pedicel long, thick, semi-erect; hairs many, erect or little reflexed.

Fruit large, variable, round, wedge shape or bluntly conical; poor appearance, coarse, irregular surface; many hairs. Dark crimson. Ripening irregularly, upper side of berry often deep red and underside white. Seeds not prominent, deeply embedded, numerous, large, dark red, often colouring before berry. Calyx partly clasping berry; sepals broad, long and downy, often recurved at tip. Flesh moderately firm, juicy; red suffused pale towards centre. Core long, broad; cavity medium. Flavour sweet, not pronounced; quality fair. Mid-season. Fertility good.

DEUTSCH EVERN (fig. 36).

This variety is said to have originated in Evern, Germany, about 1896. It has been received for trial under the names of 'Rufus,' 'Early Evern,' and 'Tuckwood Early.' It was introduced to this country, probably from Holland, about 1913.

Plant medium, compact, moderately vigorous.

Leaves medium, thin, light green. Leaflets little overlapping, deeply serrate, ciliate. Upper surface little upfolded, few scattered hairs. Lower surface few hairs and grey bloom. Petiole moderately long; green with very dense fine hairs erect on surface; channel not pronounced.

Runners profuse, slender, tinged light red.

Blossoms small to medium, white, perfect. Petals usually overlapping. Trusses often protruding beyond foliage. Peduncle medium, moderately stout; many hairs, mostly erect on surface. Pedicel long, with numerous mostly erect hairs, or near base appressed towards blossom.

Fruit medium, usually many small berries, long, conical or oblong. Bright red or scarlet, few scattered hairs. Seeds prominent on surface, little embedded, small. Calyx usually little away from berry; sepals long, narrow, very downy,

often reflexed at tip. Flesh firm, pale red. Core long, narrow; cavity small. Flavour sweet; quality good. Season early, ripening before 'Royal Sovereign.' Fertility good.

GADDESSEN.

Raised by T. Avery at Gaddesden Place, Hemel Hempstead, in 1927, and introduced by raiser in 1932. Parentage 'Royal Sovereign' × 'Givon's Late Prolific.'

Plant large, little spreading, vigorous.

Leaves large, rugose, thick, deep bluish green, little glaucous. Leaflets little overlapping, coarsely, deeply serrate to crenate, ciliate. Upper surface flat or little convex, little pubescent, few hairs scattered near margins. Lower surface much pubescent, pale grey and bluish green. Petiole long, thick; yellow-green tinged dark red; hairs many, long, sloping away from leaf; channel shallow, wide, conspicuous pale green.

Runners many, vigorous, dark red, paler beneath; hairs many, semi-appressed, pointing away from parent.

Blossoms medium size, white, perfect. Petals overlapping, nearly flat at base. Trusses held out, not protruding beyond foliage; very large, lax. Peduncle medium to long, reddish; many hairs, horizontal, often little sloping to fruit. Pedicel variable, semi-erect, hairs appressed towards flowers.

Fruit large, regular, conical, largest fruits wedge-shaped or cockscomb. Bright crimson; hairs few to many, scattered. Seeds not prominent on surface, little embedded, numerous and moderately large; pistils persisting. Calyx little clasping berry; sepals broad, long, downy, not recurved at tip. Flesh red, moderately firm, juicy. Core long, large cavity. Flavour rich, sweet; quality good. Season, ripening with 'Royal Sovereign' or little later. Fertility good.

LORD GRENFELL.

Raised by Messrs. Vilmorin, France; parentage unknown. Sent for trial by A. P. Grenfell, 1925.

Plant medium to large, moderately vigorous, compact, upright.

Leaves medium, rather thin, deep bluish green. Leaflets rarely overlapping, ciliate, serrate. Upper surface concave, markedly so in young leaves; few long hairs. Lower surface pale grey-green; pubescent. Petiole moderately long, slender; pale green; many hairs erect or little sloping towards leaf; channel rather shallow, moderately wide, little pronounced, green.

Runners many, moderately vigorous, pale green; many short hairs pointing from parent.

Blossoms medium, creamy white, often tinged pink. Petals usually little overlapping. Trusses held up and out, not often protruding beyond foliage, medium, compact. Peduncle medium, many hairs erect on surface. Pedicel medium, slender, many short, erect hairs.

Fruit medium, round or conical, often narrowing to calyx; deep red, sometimes pale and pink; hairs few, scattered. Seeds little prominent, not much embedded, numerous, small, turning red; pistils persisting. Calyx away from berry; sepals broad, short, slightly twisted, downy. Flesh firm, moderately juicy, pale red. Core long and narrow; cavity moderately large. Flavour little sub-acid; quality fair. Mid-season. Fertility moderate, many berries not finishing.

OBERSCHLESSEN.

Raised by Max Richter, Germany (parentage unknown), and introduced to commerce about 1924. Stocks received for trial from British and Continental sources.

Plant large, semi-erect, vigorous.

Leaves medium to large, *rugose, thick; medium green. Upper surface almost glabrous. Lower surface pubescent on veins; on lower half of mid-rib hairs sloping to petiole, on upper half of rib sloping to apex. Leaflets rounded, generally a little overlapping, convex, ciliate, serrate to crenate. Petiole long, of medium thickness; green; hairy; *hairs many, long, sloping away from

* Many stocks of this variety received for trial contained rogues, and the characters marked thus * are important in distinguishing plants of the true variety.

leaf *immediately* below leaflets, mainly horizontal on remainder of petiole; channel shallow, little pronounced, narrow.

Runners moderately strong, green tinged pale red; *hairs numerous, short, mainly standing out at right angles to stalk.

Blossoms medium, white, perfect. Petals overlapping, flattened at base, completely covering sepals. Trusses medium, just protruding beyond foliage, much branched. Peduncle long, *much pubescent, hairs little reflexed. Pedicel medium, semi-erect, hairs sloping to blossom.

Fruit medium to large, rounded conical, sometimes wedge-shaped, variable; scarlet or pinkish red; hairs many. Seeds embedded, not prominent. Calyx little clasping berry; sepals short and downy, occasionally recurved at tip. Flesh pale, moderately firm, juicy. Core medium, long, fairly broad; medium cavity. Flavour fair; quality second-rate. Second early to mid-season. Fertility prolific.

PHENOMENAL.

A perpetual-fruited variety raised by E. Johnson, Brentwood, in 1927; parentage 'Waterloo' x 'St. Fiacre.'

Plant moderately large, compact, upright, medium vigorous.

Leaves medium, little rugose, rather thick, leathery; medium dull green. Leaflets overlapping, margin ciliate, serrate to crenate. Upper surface concave, little pubescent, few scattered hairs. Lower surface much pubescent, pale grey-blue green. Petiole long, slender; green and red tinged; many long hairs held horizontal; channel moderately deep, rather narrow, pronounced, green.

Runners many, not vigorous, yellowish green tinged pale red; few to many short, not quite vertical hairs pointing little away from parent.

Blossoms small, white, often tinged pink, much cupped, perfect. Petals overlapping; sepals just visible from above. Trusses held up and out, not protruding beyond leaves, medium, compact. Peduncle medium or short, variable; many long hairs, erect on surface or little reflexed. Pedicel medium length, semi-erect, much pubescent, hairs standing out.

Fruit medium, conical, dark red; hairs few, scattered. Seeds not prominent, little embedded, numerous, green turning dark red; pistils persisting. Calyx not quite clasping berry; sepals medium, downy, often recurved at tip. Flesh moderately firm, juicy, deep red to white, colour suffused. Core long and narrow; cavity medium. Flavour moderately sweet; quality fair. Season early summer and autumn. Fertility rather poor.

ROYAL SOVEREIGN.

Raised by Messrs. Laxton and introduced by Laxton in 1892. Parentage 'Noble' x 'King of the Earlies.'

Plant large, moderately vigorous, thick-set, little spreading.

Leaves large, dark green, rugose. Leaflets little overlapping, coarsely serrate, margin ciliate. Under-surface hairs on veins, appressed or rarely a few standing out. Petiole long; pale red when young, turning dull crimson; hairs standing out at right angles; channel yellow-green, turning dull crimson.

Runners many, vigorous, red above, yellow-green on underside; hairs erect except at tip, where appressed and silky.

Blossoms large, white, little creamy, perfect. Petals overlapping. Trusses medium, erect or spreading, not protruding beyond foliage. Peduncle variable in length, reddish above, green beneath; pubescent, hairs standing out. Pedicel pubescent, hairs appressed towards flower.

Fruit medium to large, conical, blunt, sometimes wedge-shaped; bright scarlet; slightly hairy; pistils not usually persisting. Seeds yellow turning red, slightly embedded. Sepals spreading, hairy, rarely reflexed at tip, grey-green. Flesh pale red, firm, juicy. Core medium, short, broad. Flavour rich, sweet; quality good. Season, ripening early. Fertility good.

SHAMBLEHURST MONARCH.

Raised by Messrs. Knight, Botley, Hants, in 1926. Parentage uncertain, but believed to be a cross between 'Royal Sovereign' and 'Bedfordshire Champion.' Received for trial 1929.

Plant large, compact, upright, vigorous.

Leaves medium, rugose, little thin; dark green. Leaflets overlapping, ciliate,

* See note on p. 167.



FIG. 35. STRAWBERRY 'BEDFORD CHAMPION.'
(p. 166)

[To face p. 168.

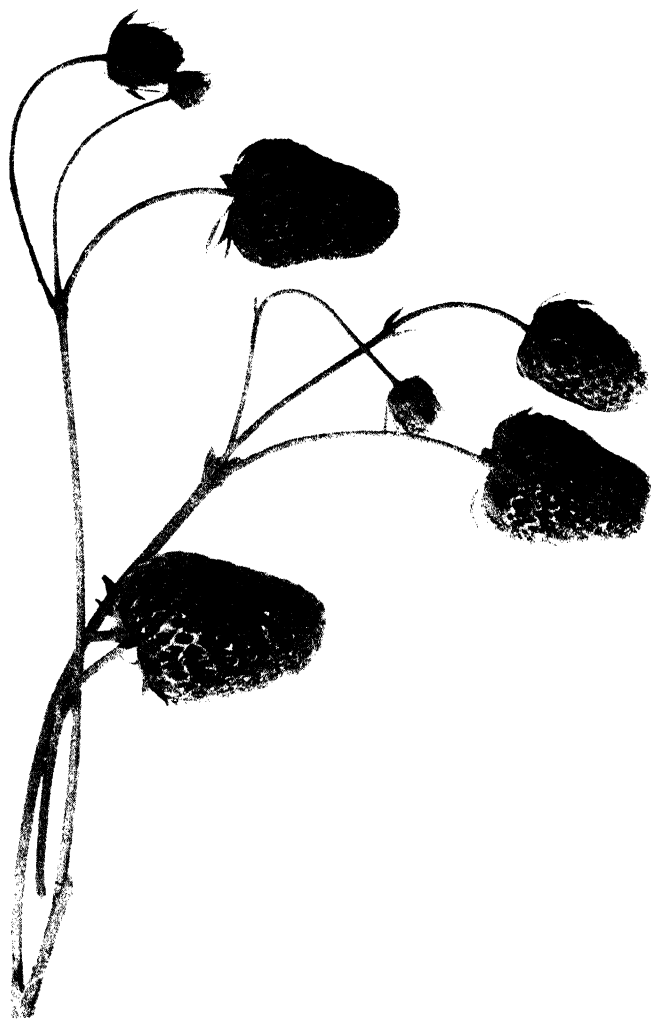


FIG. 36. STRAWBERRY 'DEUTSCH EVERN.'
p. 166



FIG. 37. STRAWBERRY. (SIR JOSEPH PANTON.)
(p. 169)

finely serrate to crenate. Upper surface upfolded, concave, usually glabrous; occasionally a few hairs on veins. Lower surface pubescent; light bluish grey-green. Petiole long; moderately stout; pale green; hairs numerous, long, semi-appressed towards leaf; channel shallow and wide, not pronounced.

Runners rather sparse, moderately vigorous; yellowish green with pale red tinge; many semi-appressed hairs pointing away from parent.

Blossoms medium, white, perfect. Petals distinctly veined, much overlapping, flattened at base; sepals visible from above. Trusses not protruding beyond foliage, medium, compact. Peduncle short, pubescent, hairs appressed towards blossom. Pedicel moderately long, thick, but variable; semi-erect; hairs appressed towards blossom.

Fruit large, irregular, conical and cockscomb; deep red; hairs few, scattered. Seeds not prominent, much embedded; green until berry full coloured, then deep red. Calyx away from berry, often reflexed; sepals broad, long, rarely twisted, downy, not often recurved at top. Flesh moderately firm, juicy, pale red to white. Core very long, narrow; cavity long, narrow. Flavour little sweet to sub-acid; quality fair. Mid-season. Fertility fair to good.

SIR JOSEPH PAXTON (fig. 37).

Raised by Mr. Bradley in 1862.

Plant medium to large, compact, moderately vigorous.

Leaves large, often flat, rather thin; dark green. Leaflets often overlapping, coarsely serrate, ciliate. Petiole long; green or reddish near top; hairs dense, long, erect; channel narrow, not pronounced, deep green.

Runners numerous, light green; hairs numerous, standing out.

Blossoms large, white, perfect. Petals overlapping. Trusses held out, not often protruding beyond leaves. Peduncle medium, stout. Pedicel long, slender, held up, hairs appressed towards flower.

Fruit large, conical, rarely wedge-shaped; deep crimson, turning dark, shining; hairs few and scattered. Seeds prominent, on surface, numerous, not as dark as flesh; pistils not persisting. Calyx sometimes away from berry, occasionally little clasping; sepals broad, medium length, downy. Flesh firm, red at surface, white in centre. Core medium; cavity large. Flavour good. Mid-season. Fertility good.

TARDIVE DE LEOPOLD.

Of French origin, particulars unknown; introduced to England about 1924.

Plant large, moderately upright, vigorous.

Leaves large, rugose, thick; dark green, shining. Leaflets overlapping, coarsely deeply serrate to crenate, ciliate. Upper surface little convex, very little pubescent, few scattered hairs near margin and apex. Lower surface little pubescent, hairs mostly on veins; pale grey-green. Petiole long; pale green; hairs many, long, standing out; channel shallow, not pronounced, wide.

Runners many, vigorous, tinged pale red; hairs standing out at right angles or slightly pointing to parent.

Blossoms medium to small, white; very few short stamens and little pollen. Petals little overlapping, variable; sepals visible from above. Trusses held out, slightly protruding beyond leaves, moderately compact. Peduncle medium to long, stout, pubescent; hairs slightly reflexed. Pedicel medium, variable; hairs many, reflexed.

Fruit large, bluntly conical; dark red, sometimes pink-red; hairs few, scattered. Seeds numerous, large, red, not prominent, much embedded. Calyx away from berry; sepals broad and moderately long, twisted, downy, not often recurved at tip. Flesh pale, moderately firm, juicy. Core long, rather narrow; large cavity. Flavour moderately rich, sweet; quality moderately good. Late. Fertility prolific.

THE WINN.

Origin unknown. Found growing wild and introduced in 1930 by J. C. Winn, Plaxtol, Kent.

Plant medium, rather spreading, moderately vigorous.

Leaves medium to large, rugose, fairly thick; deep green. Leaflets overlapping or with upturned margins pressed against neighbouring leaflets; margin coarsely and deeply serrate to crenate. Upper surface concave, little pubescent; hairs semi-erect, scattered over surface. Lower surface pale greyish blue,

many short, semi-appressed hairs. Petiole medium to long, thick; pale green; many horizontal hairs sometimes sloping a little from leaf; channel rather shallow, not pronounced, moderately wide; pale green.

Runners moderately vigorous; yellowish green tinged pale red; many short, semi-appressed hairs pointing from parent.

Blossoms medium, white, perfect. Petals overlapping, broad, flattened at base; sepals just visible from above. Trusses held out, protruding little beyond foliage, lax. Peduncle long, pubescent; hairs erect on surface. Pedicel of variable length, moderate thickness, erect, downy; hairs somewhat appressed towards blossom.

Fruit medium, regular, short, conical; dark red; hairs few, scattered. Seeds little embedded, numerous, large, rather conspicuous. Calyx clasping berry; sepals broad and long, downy, not recurved. Flesh firm, moderately juicy, dark red. Core medium, broad; cavity large. Flavour moderately rich; quality fair. Mid-season. Fertility moderate.

WATERLOO.

Raised by Mr. Bone, and introduced in 1885.

Plant medium, moderately vigorous and little spreading.

Leaves medium to small, moderately thick; dark green. Leaflets concave, coarsely and often bluntly serrate. Upper surface nearly glabrous, few scattered hairs. Lower surface dull, pubescent, pale grey-green. Petiole moderately long, thick; pale green; many hairs sloping slightly towards leaf; channel wide, pronounced, pale green.

Runners sparsely produced, vigorous, pale green, little tinged red; many short, semi-appressed hairs pointing from parent.

Blossoms medium size, dull white, perfect. Petals overlapping; sepals visible from above. Trusses held up and a little out, rarely protruding beyond foliage, medium size, compact. Peduncle variable, pubescent, hairs sloping towards blossom. Pedicel pubescent, hairs semi-appressed towards blossom.

Fruit medium to large, round to wedge shape, blunt; very dark red; many hairs. Seeds little prominent, on surface or little embedded, numerous, red; pistils persisting. Calyx clasping berry; sepals very long, often twisted, downy, not often recurved at tips. Flesh red, moderately firm and juicy. Core moderately long and narrow; cavity large. Flavour rich; quality very good. Season, late. Fertility moderate.

WINSOME.

Raised by Mr. T. E. Smiles in 1926 by crossing 'The Duke' and an unnamed seedling.

Plant medium to large, compact, semi-erect, moderately vigorous.

Leaves medium, thin, not rugose; deep green. Leaflets not overlapping, with upturned margins pressed together; serrations fine and rounded; ciliate. Upper surface concave, little pubescent; few hairs scattered near margins and apex on younger leaves; older leaves almost glabrous. Lower surface little pubescent, pale blue-grey green. Petiole long, stout, light green; hairs standing out; channel shallow, wide, not pronounced, pale yellow-green.

Runners many, moderately vigorous, yellow-green tinged light red; hairs few to many, short, semi-appressed, pointing from parent.

Blossoms medium, white, perfect. Petals little overlapping, tapering at base; sepals visible from above. Trusses held up and out, little protruding beyond foliage, rather lax. Peduncle medium, pubescent; hairs long, mostly erect on surface. Pedicel variable, medium thickness, erect; hairs appressed towards flower.

Fruit medium, regular, conical; scarlet. Seeds numerous, large, slightly embedded, green until fruit is well coloured; pistils not usually persisting. Calyx clasping berry; sepals broad and long, downy, not often recurved at tip. Flesh pale, rather soft. Core long and narrow; cavity medium. Flavour little sweet, good. Second early. Fertility moderate.

THE AWARD OF GARDEN MERIT.—XXI*

By F. J. CHITTENDEN, F.L.S., V.M.H.

151. PAPAVER COMMUTATUM.

Award of Garden Merit, December 10, 1928.

Papaver commutatum is one of the most brilliant of annuals, though like nearly all the Poppies, apt to be a little unkempt as the season advances because of the number of capsules it produces. It seems to have been introduced to this country by Mr. W. THOMPSON, of 34 Tavern Street, Ipswich, who listed the seed as *P. umbrosum* in 1876, and who obtained it from the Botanic Garden at St. Petersburg under that name.

Mr. THOMPSON thought the seed best sown in autumn, as appears both from a note in the Gardeners' Chronicle in 1876 and from a letter quoted by Dr. WITTMACK in the description which accompanies the excellent coloured plate in Garten-Zeitung, 1882, p. 299. Something of the garden history of the plant is given in that article, and by that date seed was apparently procurable from several seedsmen. The name *P. umbrosum* aroused some doubt, and as it first appeared in a seed-list from St. Petersburg Botanic Garden in 1873, Dr. WITTMACK consulted Dr. REGEL concerning it. Dr. REGEL's reply was that *P. umbrosum* was only a garden name and that the proper name was *P. commutatum*.

Upon this question Dr. REGEL had ample opportunity to decide, for *P. commutatum* had been in cultivation at St. Petersburg for many years, and the plant was thus named by Drs. FISCHER and MEYER in the seed-list of that garden for 1837, where it was also first described. The proper name of the plant is therefore *P. commutatum*, and the name *P. umbrosum* should disappear from our catalogues and gardens.

P. commutatum was regarded at first as being a form of *P. Rhoeas*, the common Red Poppy of our cornfields, and is still sometimes called *P. Rhoeas* var. *strigosum*, to which indeed it is closely allied. It can be grown in exactly the same way and in the same circumstances as that species, and the Shirley Poppies that have been derived from it. From *P. Rhoeas* it is distinct in having the hairs on the flower-stalk (but not on the stem and capsule) closely pressed flat, and in the larger size and more central position of the glossy violet-black blotch, which helps to give the flower its character. The capsules are on short stalks, which helps to distinguish this species from other allies. It is

* The notes on the first hundred plants to receive the Award of Garden Merit have been collected from our JOURNAL, vols. 47 to 53, and published as a pamphlet, price 1s. For subsequent notes see vol. 54, pp. 218 and 423; 55, pp. 121 and 276; 56, pp. 80 and 245; and 57, pp. 65 and 354.

somewhat like *P. arenarium*, and indeed THOMPSON, when he first listed the seed as *P. umbrosum*, described it as similar to *P. arenarium*, but with broader leaves.

Ordinary soil suits it. Thin sowing, either in early spring or in autumn, where the plants are to stand, and rigorous thinning will enable the plants to grow to large size, and to continue flowering over many weeks. Sow a considerable breadth of it, and treat it so, and you will have nothing brighter in the garden.

In addition to the plate in *Garten-Zeitung*, referred to already, there is a good picture of the plant in the *Botanical Magazine*, t. 9091.

152. CHEIRANTHUS × ALLIONII.

Award of Garden Merit, May 5, 1927.

Cheiranthus × *Allionii* is sometimes called the Siberian Wallflower, and it probably merits that name as little as the one by which it is commonly known, and which we have retained as the title of this note.

The doubts inferred are due to the absence of the name from botanical literature and lack of any certainty that the plant occurs wild anywhere. It is probably of hybrid origin, and as Professor D. BOIS suggested in *Revue Horticole*, 1913, pp. 443-5, its probable parents are *Cheiranthus ochroleucus* and *Erysimum Perofskianum*. This cross was made by Mr. JOHN MARSHALL of Limburn, according to Mr. JOSEPH HARRISON of Downham Market, who had it in flower in May 1850, and who tells us in the *Floricultural Cabinet* for 1850 (p. 265), where he gives a figure, that Mr. MARSHALL had difficulty in obtaining seed of *Cheiranthus ochroleucus* and therefore pollinated its flowers with pollen from *Erysimum Perofskianum*. The seed secured was "sown in the open border in 1846 and the following year the plants bloomed. One was pale yellow, like the *C. ochroleuca* [sic], and the others had orange-coloured flowers." The plants were intermediate between the parents—half-shrubby, bushy, about 12 to 18 inches high, with light green foliage and very fragrant flowers freely produced in spikes up to a foot long. The figure shows yellow flowers, but the notes on pp. 139 and 148 refer to them as being rich orange-yellow. The plant is said to be easily cultivated and easily propagated, though whether by seed or vegetatively the writer does not say.

There is nothing in the form of the flower, size, foliage and other characters as described to distinguish it from the plant we know as *C. Allionii*, and the name given it in 1850 was *C. × Marshallii*. There is a specimen in the Kew Herbarium labelled *C. × Marshallii*, dated June 1879, and described as having bright orange flowers, with which our plant also agrees. Now the plant known as *Cheiranthus ochroleucus* is usually regarded as an *Erysimum* and called *Erysimum ochroleucum*. If *C. Allionii* is identical with *C. Marshallii*, as seems probable, its correct name is *Erysimum × Marshallii*.

It is an excellent plant and, provided the drainage is thoroughly good, a hardy one. The habit is better than that of the annual *E. Perofskianum* and the flowers at least as good in colour and size, and it is perennial like *E. ochroleucum*, more erect in habit, and with brighter foliage, larger flowers and longer spikes. It is so free in flowering that it may flower itself to death, and it is therefore well to treat it like a Wallflower, sowing the seed in June for flowering in the next early summer, and it comes true from seed.

Erysimum Perofskianum was figured in the Botanical Magazine, t. 3757, from a plant raised in the Royal Botanic Garden, Edinburgh, where it flowered in 1839, the seed having come from Cabul, but its native country is probably the Caucasus and Persia. *E. ochroleucum* is a decumbent plant from the rocks of the Jura and the mountains further south and east.

153. IRIS HISTRIOIDES.

Award of Garden Merit, March 23, 1931.

This beautiful bulbous Iris is dealt with and pictured at p. 16.

154. FRITILLARIA MELEAGRIS.

Award of Garden Merit, April 12, 1926.

In *Fritillaria Meleagris* we have a native plant, growing here and there in moist meadows in England and widespread through Central Europe, as far north as Scandinavia and Denmark, as far south as the Mediterranean, and eastwards to South Russia and the Caucasus. Nowhere is it a plant of the high hills, for 2,500 feet is the greatest altitude to which it reaches. It was brought into gardens, of course, long since, and known to all the old gardeners, though little valued by some, for PARKINSON says: "I have not found or heard by any others of any property peculiar in this plant, to be applied either inwardly or outwardly for any disease: the chiefe or onely vse thereof is, to be an ornament for the Gardens of the curious louers of these delights, and to be worne of them abroad, which for the gallant beauty of many of them, deserueth their courteous entertainment, among many other the like pleasures." "The gallant beauty" of our native species has certainly led to its "entertainment" in many a garden, and it well deserves to be entertained in more. A moist soil is to be preferred, but it will grow in any light soil, and is excellent in the grass or in the light shade of thin shrubs, as well as in the border.

The almost cylindrical bulbs should be planted in September at a depth of about 4 inches. The flowers are produced in April or May on stems a foot or more long, green or purple-tinged, bearing four or five grey-green leaves. They are nodding bells, usually single, rarely two or three on the stem, purple-brown tessellated with white flecks (like a guinea-fowl, whence its specific name *Meleagris*). The segments are all about equal in size, and each has a reddish-purple midrib. Later,

as the fruit develops, it becomes erect and the naturally scattered seed will often germinate and spread the plant in suitable situations. The changes in position of the flower and fruit from the time the plant emerges from the soil are interesting to watch, and doubtless the name 'Snake's-head,' by which it is often called, has its origin in the curious fashion in which the stem curves and lays the unopened bud for a time flat on the ground, where it bears no small likeness to a viper's head.

As PARKINSON says, "There is some variety to be seen in this flower," and he seems to have seen most of those that are known save the curious form called *conlorta*.

There is the strong-growing form, generally with two or three, frequently white, flowers, six to eight foliage leaves and a green stem, called *F. Meleagris praecox*; there is variation in the colour of the flower from bright red to white, in doubling, and in the width and extent of glaucousness of the foliage, and in almost all its forms *Fritillaria Meleagris* well deserves the Award of Garden Merit, which is the mark of plants fit for all gardens.

155. PERNETTYA MUCRONATA.

Award of Garden Merit, January 14, 1929.

While it is true to say that all the plants which have received the Award of Garden Merit deserve a place in all British gardens, it is not true to say that all will grow well in all of them. That is true of the majority, but a few like *Pernettya mucronata* and most of its family require certain special conditions. This, like nearly all the family of the Heaths, resents lime, and it does best where the soil is not only free, or almost free, from lime but is moist and gritty. A sandy peat, in which Rhododendrons thrive, suits it well, but while the great beauty of Rhododendrons is seen in the comparatively short season of their flowering, the great beauty of *Pernettya mucronata* is given in autumn and winter, when the plants are laden with their round berries, each about $\frac{1}{2}$ inch across, varying in different plants from white, through grey and pink and crimson to almost black. The plant is of rigid habit, closely set, with small, stiff, ovate, shining evergreen leaves, toothed at the margin and ending in a sharp point. In May, June and July many of the upper leaves produce white flowers in their axils so that the dark green bushes look in the distance as though tinged with grey, and from these flowers develop, all being well, the berries in great quantities. It seems desirable to have bushes from more than one source so as to secure cross-pollination, for solitary bushes and groups produced by the division of one (a matter easily carried out) do not as a rule fruit freely.

A height of 6 feet may be attained, but usually 3 feet is nearer its stature. The plant is hardy save in the most severe winters, when hard frost or very cold, dry winds kill the bushes to the ground. They will spring up again, however, and flourish as before.

P. mucronata was introduced in 1828 from Magellan, at the southern extremity of South America, and was figured in the Botanical Register, t. 1675, and as *Arbutus mucronata* in the Botanical Magazine, t. 3093, and in Loddiges' Botanical Cabinet, t. 1848.

156. PHLOMIS FRUTICOSA.

Award of Garden Merit, October 7, 1929.

Phlomis fruticosa is another shrub, but this time by no means particular as to soil, though best on a deep, well-drained one, whether containing lime or not, on a bank and in full sun ; best, too, in a rather sheltered spot, for in severe winters this native of the Mediterranean region may succumb. It belongs to that most useful group of all shrubs, the group with grey evergreen leaves. The leaves are opposite, 2 to 5 inches long and $1\frac{1}{2}$ inches across, covered beneath with grey hairs, and with a few also on the upper surface. The stems are woody below, but those of the season are almost herbaceous and bear the large, dense 2-inch clusters of yellow, stalkless flowers in the leaf axils at their tops in June. The veining of the leaves gives them the appearance of a large-leaved sage, and has earned for the plant the name of Jerusalem Sage.

It was introduced to England certainly as early as the sixteenth century, and is figured in the Botanical Magazine, t. 1843.

157. RHODODENDRON FLAVUM.

Award of Garden Merit, June 9, 1930.

Rhododendron flavum is more widely known in gardens as *Azalea pontica* than under its proper name, and is possibly more commonly found in gardens than intentionally planted, for it is a stock very frequently used upon which to bud the Ghent and Mollis Azaleas, and when they die not infrequently the stock survives and takes the place of the dead scion. It is a vigorous plant and a beautiful, and worth planting for itself in all gardens where Rhododendrons will flourish—*i.e.* where the soil is lime-free.

R. flavum is a native of the Caucasus and of Asia Minor, is perfectly hardy, and was the first yellow-flowered Azalea to be introduced. It makes rather a stiff bush up to 8 feet in height, with rather narrow oblong leaves up to 5 inches long and $1\frac{1}{2}$ inches wide, hairy on the midrib beneath and on the margins, glaucous green. The sweet-scented bright yellow flowers come in May, before the leaves are much developed, and are produced with unfailing regularity in crowded clusters at the ends of the bare branches of the previous year.

It was figured in the Botanical Magazine (as *Azalea pontica*), t. 433.

R. flavum will grow in partial shade or in the sun, so long as the soil is not too dry.

OAKS IN CULTIVATION IN THE BRITISH ISLES.

By Sir OSCAR WARBURG, M.A., F.L.S., Boidier, Headley, Epsom,
and

EDMUND F. WARBURG, B.A., Trinity College, Cambridge.

THE Council of the Royal Horticultural Society has been good enough to express the desire that a list of the oaks growing at Headley, which were exhibited at the Society's Hall on August 23, 1932, should be printed for the purposes of record. We felt, however, an even more useful purpose would be served by adding to this list particulars of all the oaks which are to be found in other gardens throughout the country, so as to make the record a complete one at this date, December 31, 1932.

Apart from ELWES and HENRY'S monumental work on "The Trees of Great Britain and Ireland," the publication of which was completed in 1913, and the late Mr. VICARY GIBBS' valuable article on "Oaks at Aldenham" in this JOURNAL, 45, p. 155, very little special information has been published on the subject of the oak collections of this country. BEAN'S "Trees and Shrubs Hardy in the British Isles," now under revision and enlargement, gives valuable descriptions of about sixty species and their varieties, whilst the Kew Hand-List records the names of the fine collection of oaks in the Royal Botanic Gardens, Kew. This was, however, published in 1925, since which date a good many changes have taken place.

Apart from this magnificent collection and that at Aldenham, many fine collections exist—those at Wakehurst, Tortworth, Woburn, Borde Hill, and Westonbirt being perhaps the most notable. In addition, many rare species from Eastern Asia are growing at Caerhays. The Headley collection is quite a young one; though it includes some 120 species, varieties or hybrids, a great many are quite small.

An attempt has been made in the following pages to compile a list of all the species now in cultivation in this country, and of varieties and hybrids of natural origin. A few of the more notable garden varieties and hybrids have been included.

There is considerable misapprehension in the minds of many otherwise well-informed garden lovers as to the number of different oaks existing, and their usefulness for garden and park purposes. Many people imagine that, apart from the two native English oaks, the only ones worthy of cultivation are the two American "Red" oaks which are commonly found in gardens, the evergreen oak—which is frequently known as 'Ilex,' without a full comprehension of its being an oak at all—and possibly the hybrid Lucombe oak. There is also a widely held belief that all oaks are slow growers. It may therefore be a surprise to many that there are over five hundred oak species to be found



FIG. 38. LITHOCARPUS HENRYI. — S. Z.
(p. 178)



FIG. 39. QUERCUS COCCIFERA. — S. Z.
(p. 179)

[To face p. 176.



FIG. 40. LITHOCARPUS EDULIS. $\times \frac{3}{4}$.
(p. 178)



FIG. 41. *QUERCUS OXYCODON*. $\times \frac{1}{2}$.
(p. 178)



FIG. 42. *QUERCUS IMBRICARIA*. $\times \frac{1}{2}$.
(p. 178)



FIG. 43. *QUERCUS MARILANDICA*. — S. W.
(p. 179)



FIG. 44. --*QUERCUS ILICIFOLIA*. $\times \frac{2}{3}$.
(p. 179)



FIG. 45. —*QUERCUS AGRIFOLIA*, $\times \frac{3}{4}$.
(p. 170)

[To face p. 177.

in different parts of the world, many of them in tropical countries, that, including garden forms, there are nearly two hundred kinds established at Kew, and that many good hardy oaks will grow as much as 3 or 4 feet in a season in this country. The larger figure was the growth of a 10-foot tree of the American oak, *Quercus velutina*, at Headley during the past summer.

The familiar lobed leaf of the British oaks is by no means characteristic of the genus as a whole, and the different sections include many species with leaves like Hollies, others with evergreen leaves resembling those of the Laurel and Rhododendron, others with leaves which might be mistaken for those of a Sweet Chestnut, and finally the more familiar cut-leaved forms of the better-known American "Red" oaks.

A word of caution should be uttered regarding oaks grown from acorns collected from oak trees in the larger collections in this country. Plants grown from acorns of the fine trees at Kew of *Q. castaneaeifolia*, both of the Caucasian and the Algerian form, display variation clearly indicating that they are normally hybrids of that species and *Q. Cerris*, the Turkey oak. The pollen of this species also fertilizes many other oaks of the section *Cerris* with similar results. In the same way, pollen of *Q. Robur* plays tricks even with such species as *Q. pontica*—a dignified chestnut-leaved species which one would hardly have suspected of mating with anything so ordinary as *Q. Robur*.

Some of these combinations are mentioned in "Oaks at Aldenham." The catalogue of hybrids in the present article does not claim to be exhaustive as regards such garden hybrids, though it includes some of special interest or wide circulation.

CLASSIFICATION.

The grouping of oaks into different genera, sub-genera, and sections has been undertaken on divergent principles by different botanists. DE CANDOLLE * in 1864 adopted one classification, OERSTED * in 1866 another, based on different principles. More recent classifications are those of PRANTL * in 1894, and that of CAMILLO SCHNEIDER, 1906-18. This classification, which does not include the tropical species, was in the main followed by REHDER * in 1927. TRELEASE,* in his masterly monograph on the oaks of the American continent, also in 1927, bases his classification on that of OERSTED, with modifications.

A new grouping may very well be adopted by Mlle. AIMÉE CAMUS of Paris, who has in preparation a complete monograph on the oaks, presumably on similar lines to her recently published work on *Castanea* and *Castanopsis*.

For the purpose of the present article it appears most convenient to use REHDER's classification, as his book includes a large proportion of the oaks in the list, and it is still obtainable. This course is adopted for convenience and not from conviction. In this connexion we would refer in particular to his sections *Gallifera* and *Robur*. His separation

* See Bibliography, pp. 188-189.

of the deciduous species of this group from the half-evergreen species into two sections would appear to offer insuperable difficulties. The well-known species *Q. Mirbeckii* and *Q. lusitanica*, which are placed by him in two different sections, are considered by many botanists of repute to be local forms of the same species. Even if this view be not accepted, it is certain that they, and two other species, *Q. infectoria* and *Q. humilis*, are very closely related, and that in their wide variations they approach one another.

As regards the Central American oaks in the present list, we have not attempted to attribute them to particular sections, but have placed them in the sub-genera.

The descriptions of the different groups which follow are not intended to be a key; they are included in order to give an indication of the general character of the oaks in each of the groups. In the complete list of oaks in cultivation on pp. 180-186 the group to which each species referred to is indicated.

REHDER divides the oaks into two separate genera. The first of these is *Lithocarpus*, which includes a group of evergreen oaks found in Eastern Asia and Western America, akin to *Castanopsis*—a group intermediate between the oaks and the chestnuts. The second genus, *Quercus*, has been divided by him into three sub-genera—*Cyclobalanopsis*, *Erythrobalanus*, and *Lepidobalanus*, containing in all 11 different sections. In order to introduce the oaks to those who have not made a special study of them, illustrations have been included to show the leaf character of at least one species of each of these different sections. These genera and sections are as follows:

LITHOCARPUS Blume.

This group has large evergreen leaves, oblong to lanceolate, those of *Lithocarpus Henryi* being 8 inches long. With the exception of *L. densiflora* Hook. and Arn., they are all East Asiatic species.

Species illustrated: *L. Henryi* (Seem.) Rehd. and Wil. (fig. 38), and *L. edulis* (Mak.) Rehder (fig. 40).

QUERCUS L.

Sub-genus I. CYCLOBALANOPSIS Prantl.

A group of small evergreen or sub-evergreen trees, with oblong to lanceolate leaves, from India or Eastern Asia. The Japanese *Q. acuta* and *Q. glauca* Thunb. belong to this group.

Species illustrated: *Q. oxyodon* Miq. (fig. 41).

Sub-genus II. ERYTHROBALANUS Spach.

Section 1. PHELLOS Loud. (the Willow oaks).

Deciduous American oaks from the Eastern United States, with entire oblong to lanceolate leaves.

Species illustrated: *Q. imbricaria* Michx. (fig. 42).

Section 2. NIGRAE Loud. (the Black * oaks).

Deciduous American oaks from the Eastern United States, with leaves obovate and broadest above the middle.

Species illustrated : *Q. marilandica* Muench. (fig. 43).

Section 3. RUBRAE Loud. (the Red oaks).

American oaks with leaves sharply cut, usually turning bright red or orange in autumn. This group includes the well-known *Q. rubra* L. and *Q. coccinea* Muench., *Q. palustris* Muench. and *Q. velutina* Lam.

Species illustrated : *Q. ilicifolia* Wang. (fig. 44).

Section 4. STENOCARPAEA Oerst.

A small section of American evergreen trees.

Species illustrated : *Q. agrifolia* Née (fig. 45).

Sub-genus III. LEPIDOBALANUS Endl.

Section 5. CERRIS Oerst.

Oaks from Europe, N. Africa, and Asia, with oblong, lanceolate toothed leaves like those of a sweet chestnut, or lobed as in the Turkey oak, *Q. Cerris* L., and in the Valonia oak, *Q. Aegilops* L. The acorn-cups have long, loose scales.

Species illustrated : *Q. castaneaefolia* C. A. Mey. var. *algeriensis* Bean (fig. 46).

Section 6. SUBER Prantl.

Evergreen trees or shrubs, frequently with holly-like leaves, from the countries surrounding the Mediterranean, India, and Eastern Asia. The Cork oak, *Q. Suber* L., and the scrubby Kermes oak, *Q. coccifera* L., belong to this group.

Species illustrated : *Q. coccifera* L. (fig. 39).

Section 7. ILEX Oerst.

Evergreen trees or shrubs with leathery, often entire leaves. *Q. Ilex* L., the Holm oak, is the best-known oak of this group.

Species illustrated : *Q. Ilex* L. (fig. 47) and *Q. phillyraeoides* A. Gray (fig. 48).

Section 8. GALLIFERA Spach.

Like the preceding group, but leaves thin and deciduous or persistent only until spring.

Species illustrated : *Q. lusitanica* Lam. (fig 49).

* The term "Black Oak" is often used to include the entire sub-genus *Erythrobalanus*.

Section 9. ROBUR Reichenb.

A deciduous group with leaves normally lobed, as in the English oaks *Q. Robur* L. and *Q. sessiliflora* Salisb. The Hungarian oak, *Q. conferta* Kit., and the Pyrenean *Q. Toza* Bosc. belong to this group, as do certain oaks with toothed leaves, e.g. *Q. Mirbeckii* Durieu and *Q. pontica* K. Koch.

Species illustrated: *Q. Mirbeckii* Durieu (fig. 50) and *Q. conferta* Kit. (fig. 51).

Section 10. PRINUS Loud.

A group which includes the American White oak, largely difficult of cultivation in Britain, and also several East Asiatic oaks with deciduous leaves, dentate or lobed. The best known is probably *Q. alba* L.

Species illustrated: *Q. aliena* Blume var. *acuteserrata* Maxim. (fig. 52).

Section 11. DENTATAE Schneid.

The only species of this small group in cultivation in Britain is the Daimyo oak, *Q. dentata* Thunb., a Japanese oak with enormous leaves.

Species illustrated: *Q. dentata* Thunb. (fig. 53).

OAKS IN CULTIVATION AT HEADLEY AND ELSEWHERE IN THE BRITISH ISLES.*

The following list is that of the Headley collection, amplified by the inclusion of oaks not at present in this collection. For the latter, information is given as to one or more other collections in which they are included.

Oaks of Europe, N. Africa, and Asia Minor.

Name.	English name.	Group.	Area of origin.	Note.
QUERCUS				
<i>Aegilops</i> L.		Cerris	Greece	
<i>Pyramii</i> Boiss.		"	Asia Minor	K.
<i>Ungeri</i> Boiss.	Valonia Oak	"	"	
<i>alnifolia</i> Poech.	Golden Oak of Cyprus	Suber	Cyprus	
× <i>Auzandri</i> Gren.		Suber × Ilex	S. France, N. Africa	
(<i>coccifera</i> × <i>Ilex</i>)				
<i>castaneaefolia</i>	Chestnut-leaved	Cerris	Caucasus	
C. A. Mey.	Oak			
<i>algeriensis</i> Bean		"	Algeria	K.
(fig. 46)				

* Where a letter appears in the last column the species is not established at Boidier. C = established in open at Caerhays Castle, Cornwall; E, established in south-east England; H, established in open at Messrs. Hillier's Nursery, Winchester; K, established at Kew; N, hardiness not yet tested; T, tender in south-east England.



FIG. 49. -*QUERCUS CASTANAEFOLIA*. $\frac{1}{2}$.
(p. 170)

To face p. 186



FIG. 47. QUERCUS FLEX. $\times \frac{2}{3}$.
(p. 179)

[To face p. 481.]

<i>Name.</i>	<i>English name.</i>	<i>Group.</i>	<i>Area of origin.</i>	<i>Note.</i>
QUERCUS				
<i>Cerris</i> L.	Turkey Oak	Cerris	S. Europe and W. Asia	
<i>Ambrozyana</i>		"	Hungary	
Asch. & Graeb.				
<i>austriaca</i> Loud.		"		
* <i>coccifera</i> L. (fig. 39)	Kermes Oak	Suber	Mediterranean	
† <i>palaestina</i> Boiss.		"	Palestine	
<i>conferta</i> Kit. (fig. 51)	Hungarian Oak	Robur	S.E. Europe	
<i>Dalechampii</i> Tenore		"	S. Europe	
<i>Ehrenbergii</i> Kotsch.		Cerris	Syria	
<i>humilis</i> Lam. (<i>fruticosa</i> Brot.)		Gallifera	S.W. Europe	
<i>Ilex</i> L. (fig. 47)	Holm Oak	Ilex	Mediterranean region	
<i>Ballota</i> A.DC.	Sweet Acorn Oak	"	Spain, Portugal	
<i>expansa</i> (Poir.) Lag.		"	S. France	
<i>Gramuntia</i> L.		"	S. Europe	K.
<i>infectoria</i> Oliv.		Gallifera	Orient	
Boissieri A.DC.		"	"	K.
‡ <i>lanuginosa</i> Thuill. (<i>pubescens</i> Willd.)	Pubescent Oak	Robur	Mediterranean region	
<i>Libani</i> Oliv.	Lebanon Oak	Cerris	Asia Minor	
<i>lusitanica</i> Lam. (fig. 49)	Lusitanian Oak	Gallifera	Spain and Portugal	
<i>alpestris</i> (Boiss.) P. Coutinho		"	" " " "	H.
<i>macedonica</i> A.DC.	Macedonian Oak	Cerris	Macedonia	
<i>macranthera</i> Fisch. & Mey.		Robur	Caucasus	
<i>Mirbeckii</i> Durieu (fig. 50) (<i>lusitanica</i> Lam. var. <i>baetica</i> Webb)		"	N. Africa	
<i>pontica</i> C. Koch	Armenian Oak	"	Armenia and Caucasus	
<i>Robur</i> L. (<i>pedunculata</i> Ehrh.)	English Oak	"	Europe	
<i>Brutia</i> Tenore		"	Italy	
<i>fastigiata</i> Lam.		"	Pyrenees	
<i>Haas</i> A.DC.		"	Asia Minor	
<i>Thomasii</i> Tenore		"	Italy and Hungary	
× <i>rosacea</i> Bechst. (<i>Robur</i> L. × <i>sessiliflora</i> Salisb.)		"	Natural hybrid, Europe	
<i>sessiliflora</i> Salisb.	Durmast Oak	"	Europe	
<i>dschorochensis</i> (Ky.) A.DC.		"	Armenia	
<i>iberica</i> (Stev.) Ledeb.		"	Caucasus	
× <i>Steinei</i> Heuf. (<i>sessiliflora</i> Salisb. × <i>lanuginosa</i> Thuill.)		"	Natural hybrid, Central and S.E. Europe	
<i>Suber</i> L.	Cork Oak	Suber	S.W. Europe, N. Africa	
<i>occidentalis</i> Henry		"	S.W. Europe	K.
<i>Toza</i> Bosc.	Pyrenean Oak	Robur	S.W. Europe (?) N. Africa	

* Shows considerable variation. Several forms in cultivation at Headley.

† Abraham's oak at Hebron is of this variety.

‡ Of this there are many geographical forms with which we do not attempt to deal here.

Oaks of India and Eastern Asia.

<i>Name.</i>	<i>English name.</i>	<i>Group.</i>	<i>Area of origin.</i>	<i>Note.</i>
QUERCUS				
<i>acuta</i> Thunb.		Cyclobalanopsis	Japan	E.
<i>aquifolioides</i> Rehd. & Wils. var. <i>rufescens</i> (Franch.) Rehd. & Wils.		Suber	W. China	C.
<i>aliena</i> Blume var. <i>acuteserrata</i> Maxim. (fig. 52)		Prinus	E. Asia	E.
<i>Augustinii</i> Skan (F. 30348)		Cyclobalanopsis	Yunnan	C.
<i>Baronii</i> Skan		Cerris	W. China	E.
<i>Championii</i> Benth.		Cyclobalanopsis	Hongkong and Formosa	C.
<i>cleistocarpa</i> Seem.		Lithocarpus	W. Hupeh	E.
* <i>cuspidata</i> Thunb.		"	Japan and China	E.
<i>dealbata</i> Hook. f. & Thoms.		"	Himalayas	N.
<i>dentata</i> Thunb. (fig. 53)	Daimyo Oak	Dentatae	Japan	E.
<i>dilatata</i> Lindl. (F. 22948 [aff. dilatata])		Suber	Himalayas	K.
<i>edulis</i> Makino (fig. 40) (<i>glabra</i> S. & Z. not Thunb.)		Lithocarpus	Japan	N.
<i>Engleriana</i> Seem.		Suber	W. China	E.
<i>fenestrata</i> Roxb.		Lithocarpus	Himalayas	N.
<i>gilva</i> Blume		Cyclobalanopsis	Japan	N.
† <i>glandulifera</i> Blume		Prinus	Japan and China	E.
<i>glauca</i> Thunb. (F. 22341)		Cyclobalanopsis	Japan, China and Himalayas	E.
<i>Griffithii</i> Hook. f. & Thoms. (Farrer 1409)		Prinus	Himalaya	N.
<i>grosseserrata</i> Blume (<i>crispula</i> Blume)		"	Japan	E.
<i>Henryi</i> Seem. (fig. 38)		Lithocarpus	W. China	E.
<i>incana</i> Roxb.		Suber	Himalayas	T.
<i>lamellosa</i> Smith		Cyclobalanopsis	"	N.
<i>laotungensis</i> Koidz. (Hers 2374)		Prinus	N. China	K.
<i>lineata</i> Blume var. <i>Thomsoniana</i> Wenz.		Cyclobalanopsis	Himalayas	N.
‡ <i>lodicosa</i> E. F. Warburg (F. 24554)		Suber	S.E. Tibet, N.E. Upper Burma	
<i>mongolica</i> Fisch. & Turcz.		Prinus	N.E. Asia	Wake- hurst
||<i>myrsinaefolia</i> Blume (<i>Vibrayeana</i> Franch. & Sav.; <i>bambusaefolia</i> Fortune not Hance)		Cyclobalanopsis	Japan	E.
<i>oxyodon</i> Miq. (fig. 41)		"	Himalayas and W. China	E.
<i>pachyphylla</i> Kurz.		Lithocarpus	Himalayas	N.

* Placed by both REHDER and CAMUS in the genus *Castanopsis*, but better known as *Q. cuspidata*.

† According to KOIDZUMI and NAKAI, the oldest name for *Q. glandulifera* is *Q. serrata* Thunb.

‡ See note, p. 188.

|| Often grown under the synonyms quoted, and as *Q. glauca* and *Q. glabra*, under which erroneous names it was distributed by the Yokohama Nursery Co.

Name.	English name.	Group.	Area of origin.	Note.
QUERCUS				
<i>phillyraeoides</i> A. Gray (fig. 48)		Ilex	Japan	E.
<i>polystachya</i> Wall.		Lithocarpus	Burma	N.
<i>salicina</i> Blume		Cyclobalanopsis	Japan	Tortworth
(<i>stenophylla</i> Makino)				
* <i>semecarpifolia</i> Sm.		Suber	Himalayas and W. China	East Liss
<i>serrata</i> Thunb. (<i>acutissima</i> Carruth.) (F. 30404 vel aff.)		Cerris	E. Asia	E.
<i>spathulata</i> Seem.		Suber	W. China	C.
<i>spicata</i> Smith var. <i>brevipetiolata</i> A.D.C. (<i>squamata</i> Roxb.)		Lithocarpus	India and Burma	N.
<i>variabilis</i> Blume (F. 22340 and F. 2255 ^(b))		Cerris	E. Asia	E.
sp. (G.F. 325)				K.

Oaks of Western North America.

<i>agrifolia</i> Née (fig. 45)	Coast Live Oak. Encina	Stenocarpaea	California	
† <i>chrysolepis</i> Liebm.	Maul Oak. Cañon Oak	Ilex	Oregon, California	
<i>densiflora</i> Hook. & Arn.	Tanbark Oak	Lithocarpus	" "	
<i>Douglasii</i> Hook. & Arn.	Blue Oak	Prinus	California	
<i>dumosa</i> Nutt.	Scrub Oak	Ilex	"	
<i>turbinella</i> (Greene) Jeps.		"	"	
<i>Engelmannii</i> Greene	Mesa Oak	"	"	
<i>Garryana</i> Hook.	Oregon Oak	Prinus	N.W. America	
<i>Kelloggii</i> Newb. (<i>californica</i> Coop.)	Californian Black Oak	Rubrae	Oregon and California	
<i>lobata</i> Née	Valley Oak	Prinus	California	
× <i>Morehus</i> Kellogg (<i>Kelloggii</i> × <i>Wislizenii</i>)		Rubrae × Stenocarpaea	Natural hybrid	Borde Hill
† <i>tomentella</i> Engelm.	Island Oak	Ilex	Californian Islands	
<i>Wislizenii</i> A.D.C.	Interior Live Oak	Stenocarpaea	California	

Oaks of the Rocky Mountains

<i>Gambelii</i> Nutt.	Prinus	Colorado	K.
<i>Gunnisonii</i> Rydb.	"	Colorado to New Mexico and Utah	K.
<i>nitescens</i> Rydb.	"	Colorado to New Mexico and Utah	K.
<i>utahensis</i> Rydb.	"	Colorado to New Mexico, Utah and W. Texas	
<i>submollis</i> Sarg. (<i>Q. submollis</i> Rydb.)	"	Arizona	K.

* See Bibliography, DÜMMER.

† TRELEASE puts these two species into a separate sub-genus *Protobalanus*, between *Erythrobalanus* and *Leucobalanus*.

Oaks of Eastern North America.

<i>Name.</i>	<i>English name.</i>	<i>Group.</i>	<i>Area of origin.</i>	<i>Note.</i>
QUERCUS				
<i>alba</i> L.	White Oak	Prinus	Eastern U.S.A.	
<i>ambigua</i> Michx. (<i>bovealis</i> Michx.)		Rubrae	Northern area	
<i>arkansana</i> Sarg.		Nigrae	Arkansas	
× <i>Bebbiana</i> Schneid. (<i>macrocarpa</i> Michx. × <i>alba</i> L.)		Prinus	Natural hybrid	
<i>bicolor</i> Willd. (<i>platanoides</i> Sudw.)	Swamp White Oak	„	Whole area	
<i>bicolor</i> Willd. × <i>lyrata</i> Walt.		„	Natural hybrid	K.
× <i>Bushii</i> Sarg. (<i>marilandica</i> Muench. × <i>velutina</i> Lam.)		Nigrae × Rubrae	„ „	
<i>Catesbaei</i> Michx.		Rubrae	Southern U.S.A.	K.
<i>coccinea</i> Muench.	Scarlet Oak	„	Eastern U.S.A.	
× <i>Comptonae</i> Sarg. (<i>lyrata</i> Walt. × <i>virginiana</i> Mill.)		Prinus × Ilex	Natural hybrid, Texas	K.
* <i>cuneata</i> Wang. (<i>falcata</i> Michx.)	Spanish Oak	Rubrae	Eastern U.S.A.	
× <i>Deamii</i> Trel. (<i>Muehlenbergii</i> Engelm. × <i>alba</i> L.)		Prinus	Natural hybrid	
<i>Durandii</i> Buckl.		„	U.S. east of Mis- sissippi river to E. Texas	
<i>ellipsoidalis</i> E. J. Hill		Rubrae	Illinois to Minnesota	Alden- ham
<i>georgiana</i> M. A. Curt.	Georgia Oak	„	Georgia	K.
× <i>Hastingsii</i> Sarg. (<i>marilandica</i> Muench. × <i>texana</i> Buckl.) (Palmer 29548)		„	Natural hybrid	
× <i>heterophylla</i> Michx. (<i>rubra</i> L. × <i>Phellos</i> L.)	Bartram Oak	Rubrae × Phellos	Natural hybrid	
× <i>Hillii</i> Trel. (<i>macrocarpa</i> Michx. × <i>Muehlenbergii</i> Engelm.)		Prinus	„ „	K.
<i>ilicifolia</i> Wang. (fig. 44) (<i>nana</i> Sarg.)	Bear Oak	Rubrae	Central area	
<i>imbricaria</i> Michx. (fig. 42)	Shingle Oak	Phellos	„ „	
× <i>jackiana</i> Schneid. (<i>alba</i> L. × <i>bicolor</i> Willd.)		Prinus	Natural hybrid	
<i>Laceyi</i> Small		Prinus	W. Texas	
× <i>Leana</i> Nutt. (fig. 54) (<i>imbricaria</i> Michx. × <i>velutina</i> Lam.)	Lea Oak	Rubrae × Phellos	Natural hybrid	
<i>laurifolia</i> Michx.	Laurel Oak	Phellos	Southern area	

* SARGENT regards this as the true *Q. rubra* L., but see REHDER in Journ. Arnold Arboretum, 1929.



FIG. 18. *QUERCUS PHILLYRAEOIDES*. 7.
(p. 179)

(To face p. 184.)



FIG. 49. —*QUERCUS LUSCHANA*. — $\times \frac{7}{10}$.
(p. 179)



FIG. 50. *QUERCUS MIRBECKII*. — *ibid.*
(p. 180)



FIG. 51. QUERCUS CONFERTA. (p. 180)

(To face p. 185.)

<i>Name.</i>	<i>English name.</i>	<i>Group.</i>	<i>Area of origin.</i>	<i>Note.</i>
QUERCUS				
× <i>Ludoviciana</i> Sarg. (<i>Phellos</i> L. × <i>cuneata</i> Wang., <i>pago-daefolia</i> Ashe)		Rubrae × Phellos	Natural hybrid	
<i>lyrata</i> Walt.	Overcup Oak	Prinus	Eastern U.S.A.	
<i>macrocarpa</i> Michx.	Burr Oak	"	Northern area	
<i>marilandica</i> Muench. (fig. 43) (<i>nigra</i> Wang. non L.)	Black Jack Oak	Nigrae	Eastern U.S.A.	
* <i>Michauxii</i> Nutt.	Basket Oak	Prinus	South-eastern U.S.A.	
<i>Muehlenbergii</i> Engelm. (<i>acuminata</i> Sarg.)	Yellow Chestnut Oak	"	South-eastern U.S.A.	
<i>nigra</i> L. (<i>aquatica</i> Walt.)	Water Oak	Nigrae	Central and Southern area	
<i>palustris</i> Muench.	Pin Oak	Rubrae	Central area	
<i>Phellos</i> L.	Willow Oak	Phellos	Eastern U.S.A.	
<i>prinoides</i> Willd.	Chinquapin Oak	Prinus	Maine to Alab. W. to Minn. and Texas	
<i>Prinus</i> L. (<i>montana</i> Willd.)	Chestnut Oak	"	Northern and Central area	
<i>rhombica</i> Sarg. (<i>laurifolia</i> var. <i>rhombica</i> Trelease)		Phellos	Eastern U.S.A.	K.
<i>rubra</i> L. (<i>maxima</i> Ashe; <i>borealis</i> Michx. var. <i>maxima</i> Ashe)	Red Oak	Rubrae	Northern area	
× <i>Rudkini</i> Britten (<i>marilandica</i> Muench. × <i>Phellos</i> L.)		Rubrae × Phellos	Natural hybrid	K.
× <i>runcinata</i> Engelm. (<i>imbricaria</i> Michx. × <i>rubra</i> L.)		Rubrae × Phellos	Natural hybrid	
× <i>Sargentii</i> Rehd. (<i>Prinus</i> L. × <i>Robur</i> L.)		Prinus × Robur	Hybrid	
× <i>Saulei</i> Schneid. (<i>alba</i> L. × <i>montana</i> Willd.)		Prinus	Natural hybrid	
× <i>Schochiana</i> Dieck (<i>Phellos</i> L. × <i>palustris</i> Muench.)		Phellos × Rubrae	Natural hybrid	
<i>Shumardii</i> Buckl. var. <i>Schneckii</i> (Britt.) Sarg.		Rubrae	Kentucky to Alabama	
<i>stellata</i> Wang.	Post Oak	Prinus	Eastern U.S.A.	
× <i>subfalcata</i> Trel. var. <i>microcarpa</i> (<i>Phellos</i> L. × <i>cuneata</i> Wang.)		Robur × Phellos	Natural hybrid	
<i>velutina</i> Lam.	Black Oak	Rubrae	Eastern U.S.A.	
(<i>tinctoria</i> Michx.)				
<i>virginiana</i> Mill.	Live Oak	Ilex	Eastern U.S.A.	

Oaks of Central America.

† sp. ?? Central America

‡ *crassipes* Humb. & Bonpl.

Erythrobalanus Mexico

K., Cambridge, etc.
Carclew* Sargent regards this as the true *Q. Prinus* L.

† See note, p. 186.

‡ See note, p. 187.

Name.	English name.	Group.	Area of origin.	Note.
QUERCUS				
<i>glabrescens</i> Benth.		Leucobalanus	Mexico	Trinity Coll., Dub. N.
*sp. Guatemala (No. 1 Aldenham)		Erythrobalanus	Guatemala	N.
*,, (Nos. 2, 3, & 4, Aldenham)		Leucobalanus	Guatemala	N.
<i>polymorpha</i> Cham. & Schlecht.		"	E. Mexico and Guatemala	K. (tender)?
† <i>suchiensis</i> E. F. Warburg sp. nov.† (fig. 55)		"	Boundary of States of Mexico and Michoacan	N.

Garden Forms and Hybrids.

† × <i>audleyensis</i> Henry (<i>Ilex</i> L. × <i>sessiliflora</i> Salisb.)		<i>Ilex</i> × <i>Robur</i>		Audley End
<i>castaneaeifolia</i> C. A. Mey. × <i>Cerris</i> L.		<i>Cerris</i>		
<i>Cerris</i> L. garden forms		"		
<i>Ilex</i> L. garden forms		<i>Ilex</i>		K., Aldenham, etc. K.
× <i>kewensis</i> Osborn (<i>Wislizenii</i> A.DC. × <i>Cerris</i> L.)		<i>Stenocarpaea</i> × <i>Cerris</i>		
× <i>Koehnei</i> Ambrozy (<i>Ilex</i> L. × <i>sessiliflora</i> Salisb.)		<i>Ilex</i> × <i>Robur</i>		
× <i>Lucombeana</i> Lucombe Oak Holw. (<i>Cerris</i> L. × <i>Suber</i> L.)		<i>Cerris</i> × <i>Suber</i>		
× <i>Lucombeana</i> Fulham Oak Holw. garden forms		" " "		K., Aldenham, etc.
<i>lusitanica</i> Lam. × <i>Robur</i> L.		<i>Gallifera</i> × <i>Robur</i>		
<i>pontica</i> C. Koch × <i>Robur</i> L.		<i>Robur</i>		K.
<i>Robur</i> L. garden forms		"		K., Aldenham, etc. K.
<i>rubra</i> L. aurea Dipp. <i>sessiliflora</i> Salisb. garden forms		<i>Rubrae</i> <i>Robur</i>		K., Aldenham, etc.
<i>Turneri</i> Willd. Turner's Oak (<i>Ilex</i> L. × <i>Robur</i> L.)		<i>Ilex</i> × <i>Robur</i>		

NOTES.

Quercus sp. ?? Central America.

An oak at Kew, which was wrongly identified by ELWES and HENRY as being *Q. obtusata* Humb. & Bonp., a Mexican species, has hitherto defied our attempts at accurate diagnosis. Other well-established trees of this oak are to be found in the Cambridge Botanic Garden and elsewhere in Britain. Particulars of these are to be found in ELWES and HENRY. The acorn-cups do not possess the reflex scales which are characteristic of *Q. obtusata*, and an alternative identification given by TRELEASE, who apparently did not see the acorns of the Cambridge tree, *Q. Hartwegii* Benth., of which he made it a new form, *glabrata*, is also inadmissible. The specimens in English gardens appear to have been distributed from the nursery of Messrs. SMITH, of Worcester, at various dates between 1873 and 1885 under the name of *Q. rugosa genuensis*. This name, which being translated would mean "*Q. rugosa* of Genoa," led us to

* Too small for identification.

† See note, p. 187.

examine a seed list of the Genoa Botanic Garden of 1869, in which acorns of *Q. rugosa* are offered. The plants in English gardens therefore appear to have originated from this source. Unfortunately the tree is no longer to be found in the Genoa Botanic Garden, and no specimens from it are in the Herbarium there. The English trees are not *Q. rugosa* Née, but approximate more closely to *Q. Bonplandiana* Sweet, a name given by SWEET to a Mexican oak previously known as *Q. ambigua* H. & B., a name already given to another species. Acorns from the Kew tree produce seedlings showing wide variation, possibly owing to fertilization by alien pollen. It is quite likely, however, that the tree itself is a hybrid. Its exact classification cannot therefore yet be determined with certainty, and until further information is forthcoming we suggest that the tree should be known as *Q. genuensis* Hort., under which name it used sometimes to be found.

The Cambridge tree is described and figured in the R.H.S. JOURNAL of 1915, vol. 41, fig. 5, facing p. 8.

Q. crassipes.

A Mexican oak, of which there is a fine specimen at Carclew in Cornwall, has been classified by ELWES and HENRY as *Q. crassipes* Humb. & Bonp. At the time of its introduction it was classified by BENTHAM as *Q. mexicana* Humb. & Bonp., and by the French botanist GAY as *Q. confertifolia* Humb. & Bonp. The oak was at one time in cultivation at Angers, where it has since died out. In TRELEASE'S opinion the Carclew tree is *Q. mexicana*. The foliage resembles more closely HUMBOLDT and BONPLAND'S description and figure of *Q. crassipes*, but in the absence of acorns on the Carclew tree the most definite differential character between these two closely related species cannot be studied. We have therefore retained the name of *Q. crassipes* for this fine tree. It is doubtful whether the differences between *Q. crassipes* and *Q. mexicana* justify their being treated as distinct species. Figures of the Carclew tree and its foliage may be found in DÜMMER'S article,* and figures of the types in HUMBOLDT and BONPLAND'S* book, t. 82 and 83.

Q. × audleyensis and *Q. × Koehnei*.

A tree at Audley End was described by ELWES and HENRY and considered by them to be a hybrid of *Q. sessiliflora* Salisb. and *Q. Ilex* L. A similar parentage is attributed to *Q. × Koehnei* Ambrozy, of which there is a plant at Headley received from SPÄTH'S nursery in Berlin. The parentage suggested appears in each case to be quite a probable one, but the trees differ markedly in character. The foliage of *Q. × Koehnei* is of the texture and appearance of that of *Q. × Turneri*, the hybrid between *Q. Robur* L. and *Q. Ilex* L., whereas that of *Q. × audleyensis* is a brighter colour and less stiff texture, and variable in shape and tootching.

Q. suchiensis sp. nov. (fig. 55).

Tree probably subevergreen. Branchlets pale brown, slightly grooved with prominent lenticels, 4–5 mm. in diameter. Buds brown, ovoid, pubescent, 2 × 3 mm. with deciduous stipules. Leaves obovate, 10–17 cm. long, 6–11 cm. wide, very obtuse at the apex, cordate or subcordate at the base, with a few very shallow crenations each ending in a short mucro, veins 8–10 pairs on each side, somewhat looped and branching into numerous veinlets near the margin, impressed above, prominently raised below. Leaves pale green above, glabrous except for a slight brown pubescence on the midrib, paler and glaucous beneath with a loose rusty-brown stellate pubescence, especially on the veins. Petioles puberulous, 4–7 mm. long, about 3 mm. wide, flat above, rounded beneath. Flowers unknown. Fruit 1–3, ripening the first year, sessile and crowded on the end of a peduncle 5–13 cm. long, 2–3 mm. wide (when only 1 with 1 or 2 aborted fruits also present). Cup hemispheric, 1.5–1.7 cm. in diameter, rather thick, densely pubescent within, the scales pale brown with thickened bases, tightly appressed, their apices darker, glabrous, subacute. Acorn ellipsoid, 2–2.5 cm. long, glabrous outside and inside.

Q. suchiensis differs from most species of its group by the thickened bases of the cup scales and larger leaves. Of the other large-leaved species *Q. innuncupata* Trel. has differently shaped (elliptic or obovate-oblong) leaves, *Q. conglomerata* Trel. and *Q. decipiens* Mart. & Gal. thin and loose scales, *Q. Purpusii* Trel. smaller

* See Bibliography, p. 188.

leaves and larger, solitary acorn-cups, and *Q. rhodophlebia* Trel. thin or keeled scales and smaller pink-veined leaves and a glabrescent midrib.

From the properties of the SUCHI TIMBER Co., Mexico, about 9,000 feet on the boundaries of the States of Mexico and Michoacan.

Specimen collected by Mr. ROBERT HEATLEY, of the Suchi Timber Co., in February 1932, and acorns sent to HEADLEY.*

Q. lodicosa sp. nov.

Q. lodicosa sp. nov. is allied to *Q. lanata* Don of the Indian Himalaya, which it replaces in North-east Upper Burma and South-east Tibet, and from which it differs in the more numerous veins and smaller, more numerous teeth of the leaves, much larger and thicker acorn-cup, and less tomentose acorn.*

Our thanks are due to the Director of the Royal Botanic Gardens, Kew, for facilities afforded by him which have enabled us to include numerous rare oaks which are in cultivation at Kew.

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* It is intended to publish the technical description of these two species in a forthcoming number of the Kew Bulletin.



FIG. 52. *QUERCUS ALIENA*. $\times \frac{1}{3}$.
(p. 186)

[To face p. 188.]



FIG. 53. QUERCUS DENTATA. $\times \frac{1}{2}$.
(p. 180)

[To face p. 180.]

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* A new edition is in course of issue.

N.B.—The books indicated by † may be consulted in the Lindley Library at Vincent Square.

YUCCA RECURVIFOLIA.

YUCCAS are stately plants, many of them hardy, all of them beautiful in flower, and some of them regular in flowering. They have the additional advantage that they are difficult to misplace in a garden. No doubt the myth that they "flower once in a hundred years," which persists in spite of abundant ocular evidence to the contrary, is responsible for the comparatively small number seen.

There are several hardy species and the one illustrated in fig. 56 from a photograph kindly sent by Mr. FREDERICK BOSTOCK, taken in his garden at Pitsford House, Northampton, on August 30, 1932, is one of the best as well as one of the commonest. It is a good town plant and asks no more than a sunny position in a well-drained soil—a light loam suiting it best. *Yucca gloriosa* is a taller plant with stiffer leaves and perhaps more susceptible to injury by damp. *Y. recurvifolia* comes from Georgia where it grows especially in the region of the coast and its well-protected leaves ensure that it shall never suffer from drought.

WISTARIA FLORIBUNDA.

THE photograph reproduced in fig. 57 was very kindly sent to us by the late Professor Dr. J. VALCKENIER-SURINGAR, of Wageningen, the well-known writer on the botanical nomenclature of trees, shortly before his death.

It represents *Wistaria floribunda* growing on his house, Villa Berghem, Wageningen, Holland, not far from the banks of the Rhine, and was taken on June 7, 1932. The racemes were about 18 inches in length.

This form of *W. floribunda* is better known under the name of *W. multijuga* in this country and it appears to be a garden variety of *W. floribunda* raised in Japan (where there are some celebrated examples) and brought to Europe by SIEBOLD. It has been grown in this country for about sixty years but is not so well known as it should be. Seedlings vary a good deal in the length of the raceme (which may be twice as long as in the plant illustrated) and selection of plants to grow should therefore be made in the nursery—but better still grow layers from the best plants. It seems to prefer a rather moist site and it is seen at its best where it is reflected in a pool.

DAHLIAS AT WISLEY, 1932.

SIXTY-NINE seedling varieties of Dahlia had been selected for trial at Vincent Square in 1931, and these, with those carried over from earlier years for comparison, made 297 varieties in the trial for 1932. The arrangement and planting methods were the same as in previous years, and the Joint Committee of the Royal Horticultural Society and the National Dahlia Society judged the new varieties on August 31, when most of them were at their best. A few varieties were later, but as the late flowering of Dahlias shortens the season very considerably, these may be passed over.

The National Dahlia Society awarded its Gold Medal to the new variety 'Glorious' from Mr. J. T. WEST, of Brentwood.

AWARDS, DESCRIPTIONS, AND NOTES.

MIGNON SINGLE DAHLIAS.

AWARDS.

Scarlet Gem, A.M. August 31, 1932. Raised and sent by Messrs. Dobbie, Edinburgh.

Pink Gem, H.C. August 31, 1932. Raised and sent by Messrs. Dobbie.

Pink.

PINK GEM (Dobbie), **H.C.**—2 feet. Flowers 3 to 3½ inches diameter; bright rose-pink; on 6- to 9-inch stalks, erect and well above foliage.

Scarlet.

SCARLET GEM (Dobbie), **A.M.**—20 inches. Flowers 3 to 3½ inches diameter; bright scarlet, lighter and brighter than 'Coltness Gem'; on 6- to 9-inch stalks, erect, well above foliage.

DOUBLE COLLERETTE DAHLIAS.

Rose-magenta.

AUREEN (West).—4 feet. Flowers 4½ to 5 inches diameter; dull pale rose-magenta, collar florets dull white faintly edged pale red; on 9- to 16-inch stalks, drooping, above foliage.

SMALL-FLOWERED PÆONY DAHLIAS.

AWARDS.

Ayesha, A.M. August 31, 1932. Raised and sent by Messrs. W. Treseder, of Cardiff [**H.C.** 1931].

Freda Pawley, H.C. August 31, 1932. Raised and sent by Messrs. W. Treseder.

Little Wonder, H.C. August 31, 1932. Raised and sent by Messrs. H. Langridge, of Westerham.

Old Gold.

AYESHA (Treseder), **A.M.**—Described JOURNAL R.H.S. 57, p. 76.



FIG. 54. - QUERCUS S. LEANA. - X $\frac{2}{3}$.
(p. 184)

[To face p. 192.]



FIG. 55. —*QUERCUS SUCHIENSIS*. $\times \frac{2}{3}$.
(p. 187)



FIG. 56. *YUCCA RECURVIFOLIA* AT PITSFORD HOUSE, NORTHAMPTON.
(p. 199)



FIG. 57.—WISTARIA FLORIBUNDA ON VILLA BERGHEM, WAGENINGEN.
(p. 191)

[To face p. 193.

Pink on Yellow.

VIOLET HODGE (Cobb).—4 feet. Flowers $3\frac{1}{2}$ inches; pale rose deepening to crimson at disc; rays incurved and curled; free, erect, on 6- to 14-inch stems, well above foliage.

LILA (Burrell).— $4\frac{1}{2}$ feet. Flowers 4 to $4\frac{1}{2}$ inches; bright rose-pink shaded pale orange; rays flat, pointed, inner channelled; free, erect, on 9- to 15-inch stalks, well above foliage.

DAME ALICE GODMAN (Cheal).— $4\frac{1}{2}$ feet. Flowers $3\frac{1}{2}$ to 4 inches; bright rose-pink on yellow, orange at disc; rays flat, pointed; free, erect, on 8- to 13-inch stalks, well above foliage.

RUTH TOMALIN (Tomalin).—7 feet. Flowers 4 inches; bright rose-pink shaded yellow; rays flat, pointed, inner curled and twisted; not very free, erect, on 9- to 18-inch stalks, well above foliage.

FREDA PAWLEY (Treseder), **H.C.**— $3\frac{1}{2}$ feet. Flowers 3 to $3\frac{1}{2}$ inches; bright rose-pink, shaded crimson at disc; rays flat, pointed, inner channelled; free, erect, on 9- to 15-inch stalks, well above foliage.

Pink.

LITTLE WONDER (Langridge), **H.C.**—6 feet. Flowers 3 inches; bright cerise-pink; rays flat, blunt, somewhat incurved; free, erect, on 9- to 16-inch stalks, well above foliage.

Scarlet.

EDITH GODMAN (Cheal).— $4\frac{1}{2}$ feet. Flowers $3\frac{1}{2}$ inches; bright scarlet; rays flat, pointed; free, erect, on 9- to 12-inch stalks, well above foliage.

DWARF PÆONY-FLOWERED DAHLIAS.

Scarlet.

A. A. PETTIGREW (Treseder).—2 feet. Flowers 3 to $3\frac{1}{2}$ inches; bright rich deep scarlet; rays flat, blunt, tips reflexed; free, erect, on 6- to 10-inch stalks, well above foliage.

DECORATIVE DAHLIAS.

a. Large-flowered.

AWARDS.

Avis Cowdrey, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Stredwick, Silverhill Park, St. Leonards-on-Sea [**H.C.** 1930].

J. B. Riding, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Stredwick.

J. Titterington, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Stredwick.

Daily Mail, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Stredwick [**H.C.** 1930].

Cayclerc, **A.M.** August 31, 1932. Raised by Messrs. Cayeux et le Clerc, of Paris, and sent by Messrs. R. H. Bath, Wisbech.

Glory, **A.M.** August 31, 1932. Raised and sent by Messrs. J. G. Ballego, Leiden, Holland.

Lady Snagge, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Cheal, of Crawley, Sussex [**H.C.** 1929].

Arthur Burns, **A.M.** August 31, 1932. Raised and sent by Mr. J. T. West, of Brentwood, Essex.

Montrose, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Stredwick.

A. T. Barnes, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Stredwick.

Royal Velvet, **A.M.** August 31, 1932. Raised and sent by Messrs. H. Carlée, of Haarlem, Holland.

White.

MARJORY HORNE (Stredwick).—6 feet. Flowers 6 to 8 inches; white; rays flat, somewhat pointed, inner channelled; free, erect, on 9- to 12-inch stalks, above foliage.

AVIS COWDREY (Stredwick), **A.M.**—Described **JOURNAL R.H.S.** 56, p. 100.

Yellow.

J. B. RIDING (Stredwick), **A.M.**—5½ feet. Flowers 6 to 9 inches ; bright rich lemon-yellow ; rays flat, somewhat pointed, inner margins recurved ; free, erect, on 9- to 15-inch stalks, well above foliage.

Yellow and Buff.

DAILY MAIL (Stredwick), **A.M.**—Described JOURNAL R.H.S. 56, p. 100.

Amber.

J. TITTERINGTON (Stredwick), **A.M.**—5 feet. Flowers 6 to 8 inches ; bright amber ; rays flat, blunt, inner somewhat channelled ; free, erect, on 9- to 16-inch stalks, well above foliage. Previously named 'Laurentic.'

CAYCLERC (Bath), **A.M.**—5 feet. Flowers 6 to 8 inches ; old gold veined scarlet ; rays flat, pointed, tips reflexed, inner channelled ; free, erect, on 9- to 15-inch stalks, well above foliage.

Mauve.

PINK PRESTIGE (Stredwick).—3½ feet. Flowers 6½ to 8 inches ; pinkish-mauve ; rays flat, pointed, inner channelled ; free, erect, on 6- to 12-inch stalks, well above foliage.

Orange shaded Red.

F. L. GIBSON (Stredwick).—6 feet. Flowers 6 to 8 inches ; bright orange shaded red ; rays flat, pointed ; free, erect, on 9- to 14-inch stalks, well above foliage.

Rosy-Red.

ARTHUR BURNS (West), **A.M.**—3½ feet. Flowers 6 to 9 inches ; bright rich rosy-red ; rays flat, pointed, inner somewhat channelled ; free, erect, on 9- to 15-inch stalks, well above foliage.

GEORGE A. ORMEROD (Stredwick).—6 feet. Flowers 6 to 8 inches ; bright coral-red ; rays flat, pointed ; free, erect, on 9- to 14-inch stalks, well above foliage.

Rosy-Scarlet.

LADY SNAGGE (Cheal), **A.M.**—Described JOURNAL R.H.S. 55, p. 129.

Crimson-Scarlet, Tips White.

FUSEE (Stredwick).—6 feet. Flowers 5 to 7½ inches ; dull crimson-scarlet, tips whitish ; rays flat, pointed, tips incurved, inner somewhat incurved at margins ; free, erect, on 9- to 15-inch stalks, well above foliage.

Crimson and Yellow.

GLORY (Ballego), **A.M.**—4 feet. Flowers 6 to 7 inches ; lemon-yellow suffused with crimson, margins and tips lemon-yellow ; rays broad, flat, somewhat pointed ; free, erect, on 12- to 16-inch stalks, well above foliage.

Crimson.

A. T. BARNES (Stredwick), **A.M.**—5½ feet. Flowers 6 to 8 inches ; rich crimson ; rays broad, flat, pointed, inner channelled ; free, erect, on 9- to 14-inch stalks, well above foliage.

MONTROSE (Stredwick), **A.M.**—5½ feet. Flowers 6 to 8 inches ; deep dull crimson ; rays broad, flat, pointed ; free, erect, on 9- to 13-inch stalks, well above foliage.

ROYAL VELVET (Carlée), **A.M.**—Described JOURNAL R.H.S. 57, p. 78.

Crimson-Maroon.

C. E. COMPSON (Dickson & Robinson).—4 feet. Flowers 5 to 8 inches ; deep rich crimson-maroon ; rays broad, flat, twisted at tips, pointed, inner curled and twisted ; free, erect, on 8- to 12-inch stalks, well above foliage.

Crimson-Purple.

COMMANDER H. HIGHFIELD (Stredwick).—6 feet. Flowers 6 to 9 inches ; rich crimson-purple ; rays broad, flat, pointed ; free, erect, on 9- to 16-inch stalks, well above foliage.

PURPLE EMPEROR (Stredwick).—5 feet. Flowers 6 to 9 inches ; deep purplish-crimson ; rays broad, pointed, flat, tips curled, inner channelled ; free, erect, on 9- to 14-inch stalks, at first hidden by foliage, then above.

b. Medium-flowered.

AWARD.

Lowfield Scarlet, H.C. August 31, 1932. Raised and sent by Messrs. J. Cheal.

Cream-Pink.

NORTHERN BEAUTY (Dickson & Robinson).—5½ feet. Flowers 4½ to 5½ inches ; soft creamy-pink ; rays flat, recurved at margins, pointed, inner channelled ; free, erect, on 9- to 15-inch stalks, well above foliage.

Carmine, Tips White.

SEVERN (Cheal).—6 feet. Flowers 5 to 6 inches ; deep rich carmine-red, tips whitish ; rays flat at base, margins recurved at tips ; free, erect, on 9- to 16-inch stalks, at first partly hidden by foliage, then above.

Scarlet.

LOWFIELD SCARLET (Cheal), **H.C.**—5½ feet. Flowers 4½ to 5½ inches ; bright scarlet ; rays flat, pointed, inner channelled ; free, erect, on 9- to 15-inch stalks, well above foliage.

RUSTON (Burrell).—3½ feet. Flowers 4 to 5½ inches ; rich scarlet ; rays channelled, pointed ; free, erect, on 6- to 12-inch stalks, well above foliage.

BESSBOROUGH SCARLET (Tomalin).—6 feet. Flowers 6 inches ; rich scarlet ; rays flat, pointed, tips reflexed, inner channelled ; free, erect, on 9- to 16-inch stalks, well above foliage.

ROBIN PEARMAN (Pearman).—6 feet. Flowers 5 to 6 inches ; rich scarlet ; rays flat at disc, margins recurved at tips, pointed ; free, erect, on 10- to 16-inch stalks, well above foliage.

c. Small-flowered.

AWARDS.

- Dorcas, A.M.** August 31, 1932. Raised and sent by Mr. J. T. West.
Vanity, A.M. August 31, 1932. Raised and sent by Messrs. Jarman, of Chard.
Little Jean, A.M. August 31, 1932. Raised and sent by Mr. J. T. West.
Peter, A.M. August 31, 1932. Raised and sent by Mr. J. T. West.
Gladness, A.M. August 31, 1932. Raised and sent by Mr. J. T. West.
R. Sandford, A.M. August 31, 1932. Raised and sent by Mr. R. Sandford, of Barton Mills, Mildenhall, Suffolk.
Glorious, A.M. August 31, 1932. Raised and sent by Mr. J. T. West.
Donald Clark, A.M. August 31, 1932. Raised and sent by Mr. J. T. West.
Selbourne, A.M. August 31, 1932. Raised and sent by Messrs. J. Stredwick.
Purple Profusion, A.M. August 31, 1932. Raised and sent by Messrs. J. Cheal.
Horizon, H.C. August 31, 1932. Raised and sent by Mr. J. T. West.
Roger, H.C. August 31, 1932. Raised and sent by Mr. J. T. West.
Indian, H.C. August 31, 1932. Raised and sent by Messrs. J. Stredwick.

Pink on Yellow.

HORIZON (West), **H.C.**—5 feet. Flowers 4 to 5 inches ; creamy-pink shaded to sulphur at disc ; rays pointed, incurved ; free, erect, on 8- to 15-inch stems, well above foliage.

DORCAS (West), **A.M.**—5 feet. Flowers 4 to 4½ inches ; bright rich rose shaded orange at disc ; rays broad, flat, pointed, tips reflexed ; free, erect, on 9- to 15-inch stalks, well above foliage.

Pink.

VANITY (Jarman), **A.M.**—6 feet. Flowers 3½ inches ; pale rose-pink ; rays narrow, pointed, somewhat incurved ; free, erect, on 9- to 14-inch stalks, well above foliage.

LADY MOYRA PONSONBY (Tomalin).—6 feet. Flowers 4 to 4½ inches ; pale rose-pink ; rays broad, pointed, flat ; free, erect, on 9- to 15-inch stalks, well above foliage.

HELEN HOOPER (Stredwick).—3½ feet. Flowers 3½ inches ; bright rose-pink ; rays channelled, pointed ; free, erect, on 6- to 12-inch stalks, well above foliage.

Buff.

YOUTH (West).—5½ feet. Flowers 4 to 4½ inches ; rich reddish-buff ; rays narrow, pointed, incurved ; free, erect, on 9- to 14-inch stalks, at first hidden by foliage, afterwards above.

Yellow and Terra-cotta.

PETER (West), **A.M.**—4 feet. Flowers 3½ to 4 inches ; lemon shaded pale terra-cotta ; rays narrow, pointed, incurved ; free, erect, on 9- to 14-inch stalks, well above foliage.

LITTLE JEAN (West), **A.M.**—5 feet. Flowers 3½ to 4½ inches ; rich old gold shaded terra-cotta ; rays pointed, channelled, tips reflexed ; free, erect, on 9- to 18-inch stalks, well above foliage.

ROGER (West), **H.C.**—4 feet. Flowers 4 to 5 inches ; bright bronzy-yellow lightly suffused terra-cotta ; rays flat, pointed, tips reflexed, inner channelled ; free, erect, on 9- to 15-inch stalks, well above foliage.

Carmine.

GLADNESS (West), **A.M.**—5½ feet. Flowers 4 to 4½ inches ; rich rosy-carmine ; rays broad, flat, pointed ; very free, erect, on 9- to 16-inch stalks, well above foliage.

Yellow flaked Red.

RELIEF (West)—4 feet. Flowers 4½ inches ; bright yellow flaked and speckled scarlet ; rays flat, pointed, inner channelled ; free, erect, on 9- to 14-inch stalks, well above foliage.

Rose-Red.

GLORIOUS (West), **A.M.**—3½ feet. Flowers 3 inches ; bright rosy-red ; rays narrow, deeply channelled ; very free, erect, on 6- to 9-inch stalks, well above foliage. (Gold Medal, N.D.S., 1932.)

VEDIC (Burrell).—5 feet. Flowers 3½ to 4 inches ; rich rosy-crimson ; rays flat, pointed ; free, erect, on 9- to 12-inch stalks, above foliage.

Orange shaded Red.

R. SANDFORD (Sandford), **A.M.**—5 feet. Flowers 3½ to 4 inches ; bright orange shaded red ; rays broad, pointed, flat, inner channelled ; free, erect, on 9- to 15-inch stalks, well above foliage.

EVELYN (Stredwick).—4 feet. Flowers 3½ to 4 inches ; bright rosy-scarlet, shaded orange ; rays flat, pointed, inner channelled ; free, erect, on 9- to 14-inch stalks, well above foliage.

Scarlet.

GLARE (West).—4 feet. Flowers 4 inches; bright rich scarlet; rays broad, pointed, incurved; free, erect, on 6- to 10-inch stalks, well above foliage.

SELBOURNE (Stredwick), **A.M.**—4½ feet. Flowers 3½ to 4½ inches; rich glowing scarlet; rays broad, flat, pointed, incurved; very free, erect, on 6- to 15-inch stalks, well above foliage.

TOWNELEY PRIDE (Barwise).—3½ feet. Flowers 3½ to 4 inches; deep rich scarlet; rays flat, tips reflexed; free, erect, on 6- to 10-inch stalks, at first hidden by foliage, afterwards above.

DONALD CLARK (West), **A.M.**—5 feet. Flowers 4 to 4½ inches; deep rich scarlet; rays broad, flat, pointed; very free, erect, on 6- to 14-inch stalks, well above foliage.

Crimson.

INDIAN (Stredwick), **H.C.**—4½ feet. Flowers 3½ inches; rich crimson; rays blunt, channelled; free, erect, on 9- to 12-inch stalks, well above foliage.

Purplish-Crimson.

PURPLE PROFUSION (Cheal), **A.M.**—5 feet. Flowers 3½ inches; purplish-crimson; rays deeply channelled, somewhat pointed; free, erect, on 9- to 12-inch stalks, well above foliage.

DWARF DECORATIVE DAHLIAS.

AWARD.

Catherine Clark, **A.M.** August 31, 1932. Raised and sent by Mr. J. T. West.

CATHERINE CLARK (West), **A.M.**—2½ feet. Flowers 4½ inches; rosy-red, tips white; rays broad, flat, pointed; very free, erect, on 9-inch stalks, well above foliage.

POMPON DAHLIAS.

AWARD.

Dick, **H.C.** August 31, 1932. Raised and sent by Mr. J. T. West.

Orange and Terra-cotta.

MASTER MICHAEL (Austin).—4 feet. Flowers 1½ to 1¾ inches; bright rich orange shaded terra-cotta; very free, erect, on 6- to 9-inch stalks, well above foliage.

LITTLE DAVID (Gibson & Amos).—4½ feet. Flowers 1¾ to 2 inches; bright rosy terra-cotta shaded orange; free, erect, on 9- to 12-inch stalks, at first hidden by foliage, then above.

Purple.

DICK (West), **H.C.**—4 feet. Flowers 2 inches; dull crimson-purple; free, erect, on 9- to 15-inch stalks, well above foliage.

CACTUS DAHLIAS.

AWARDS.

Madame Flore Braem, **A.M.** August 31, 1932. Raised by M. Flore Braem and sent by Mr. J. B. Riding, of Chingford, Essex.

Daniel Bliss, **A.M.** August 31, 1932. Raised and sent by Messrs. W. Treseder, of Cardiff.

Glamis, **H.C.** August 31, 1932. Raised and sent by Messrs. J. Stredwick.

Yellow.

VICTORIA (Stredwick).—5 feet. Flowers 5 to 6 inches; sulphur-yellow; free, erect, on 9- to 12-inch stalks, above foliage.

GLAMIS (Stredwick), **H.C.**—Described **JOURNAL R.H.S.** 57, p. 79.

Pink on Yellow.

FREEMASON (Stredwick).—6½ feet. Flowers 6 inches; creamy-coral, inner florets amber tinged pink; free, erect, on 9- to 15-inch stalks, well above foliage.

KAREOL (Carlée).—6 feet. Flowers 5½ to 6½ inches; pinkish-buff, inner florets bright rose-pink on cream; free, erect, on 9- to 18-inch stalks, well above foliage.

MADAME FLORE BRAEM (Riding), **A.M.**—4 feet. Flowers 6 inches; pale rose on sulphur-yellow, inner florets sulphur-yellow; free, erect, on 9- to 14-inch stalks, well above foliage.

Mauve.

DANIEL BLISS (Treseder), **A.M.**—5 feet. Flowers 6 inches; pinkish-mauve; very free, erect, on 10- to 16-inch stalks, well above foliage.

SEMI-CACTUS DAHLIAS.

AWARDS.

Marjorie, **A.M.** August 31, 1932. Raised and sent by Messrs. W. Treseder, of Cardiff.

Arun, **A.M.** August 31, 1932. Raised and sent by Messrs. J. Cheal, of Crawley, Sussex.

Alex. Craig, **A.M.** August 31, 1932. Raised by Mr. Brown and sent by Mr. J. B. Riding.

Unicum, **H.C.** August 31, 1932. Raised and sent by Messrs. D. Bruidegom, of Baarn, Holland.

Ami Choquet, **H.C.** August 31, 1932. Raised by Messrs. Cayeux et le Clerc and sent by Messrs. W. Topsvoort, of Aalsmeer, Holland.

Ivory.

TRUCE (Burrell).—5 feet. Flowers 3½ to 4 inches; creamy-ivory; free, erect, on 6- to 12-inch stalks, at first hidden by foliage, then above.

MARJORIE (Treseder), **A.M.**—4 feet. Flowers 5½ to 7 inches; ivory-white; very free, erect, on 9- to 15-inch stalks, well above foliage.

Yellow and Pink.

ARUN (Cheal), **A.M.**—5 feet. Flowers 4½ to 5½ inches; pale lemon-yellow, tips of florets tinged pale rose; free, erect, on 6- to 12-inch stalks, well above foliage.

Pink.

ALEX. CRAIG (Riding), **A.M.**—6 feet. Flowers 5½ to 6½ inches; soft cream-pink, inner florets pale cream tinged pink; very free, erect, on 9- to 16-inch stalks, above foliage.

UNICUM (Bruidegom), **H.C.**—Described **JOURNAL R.H.S.** 57, p. 79.

Orange.

APRICOT QUEEN (Cheal).—5½ feet. Flowers 4½ to 5½ inches; deep rich orange; free, erect, on 9- to 15-inch stalks, well above foliage.

Scarlet.

WINNIE (Cheal).—5 feet. Flowers 4½ to 5 inches; deep rich scarlet; free, erect, on 9- to 12-inch stalks, at first partly hidden by foliage, then above.

Crimson.

AMI CHOQUET (Topsvoort), **H.C.**—5½ feet. Flowers 5 to 6 inches; rich crimson; free, erect, on 9- to 14-inch stems, well above foliage.

STAR DAHLIAS:

Scarlet shaded Orange.

LOWFIELD STAR (Cheal).—4 feet. Flowers 3 inches; bright scarlet shaded orange; free, erect, on 9- to 12-inch stalks, well above foliage.

BEARDED IRISES TRIED AT WISLEY, 1932.

THE following report brings the information on the Bearded Iris Trials at Wisley up to the end of the season 1932, and is drawn up on the same lines as the previous reports in this JOURNAL, vols. 53, pp. 116-160; 55, pp. 132-140; 56, pp. 85-96; and 57, pp. 70-74. The varieties now described have qualified for inclusion in the Standard Collection, and the varieties displaced are shown, as well as those selected by the Judging Committee for Award, and new varieties received for trial.

The classification followed is the same as that in earlier reports.

AWARDS, DESCRIPTIONS, AND NOTES.

CLASS I. WHITE OR NEARLY WHITE VARIETIES.

Lenzschnee (SNOW IN SPRING), A.M. 1932.—Vigorous and of rapid increase; foliage erect, 22 inches high. Flower stems 30 inches, erect, 6-flowered, branches short. Flowers close, large, well-proportioned, stiff. Standards domed, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, white faintly tinged blue. Falls straight-hanging, $2\frac{1}{4} \times 2\frac{3}{8}$ inches, almost circular, bluish white, veins brownish on haft. Beard white, apex of hairs yellow. Flowering for 14 days from June 10. Raised by Messrs. Goos & Koenemann, introduced 1930, and sent by Messrs. Wallace, Tunbridge Wells.

YVES LASSAILLY.—Of rapid increase and vigorous, with foliage 18 inches high, erect. Flower stems 3 feet high, erect, with short branches, 8-flowered. Flowers large, well-proportioned, stiff. Standards domed, waved at margins, $2\frac{1}{2} \times 2\frac{1}{4}$ inches, dull white, base yellowish. Falls drooping, $2\frac{1}{2} \times 2\frac{3}{8}$ inches, dull white faintly flushed blue, veins yellowish brown on haft. Beard white, upper half of hairs yellow. Flowering for fourteen days from June 8. Raised and sent by Messrs. Cayeux et le Clerc. Introduced 1928.

The following varieties have been added to this class for future judgment :

FROZEN FOAM (Dykes).

GUDRUN (Dykes).

CLASS II A a (1).

The following variety has been added for future judgment :

STIPPLES (Essig).

The following variety has been relegated to the General Collection :

CAMELOT : 32 inches ; May-June.

CLASS II A a (2).

The following variety has been added for future judgment :

TRUE DELIGHT (Sturtevant).

CLASS III b.

The following varieties have been relegated to the General Collection :

DOROTHEA : 20-22 inches ; May.

ECLAIREUR : 26-28 inches ; May-June.

SILVERDALE : 24 inches ; June.

TINTALION : 18 inches ; June.

CLASS IV a.

Marjorie, A.M. 1932.—Vigorous and of rapid increase, with spreading foliage erect, 26 inches high. Flower stems 40 inches high, erect, 12-flowered, branches long and widely spaced. Flowers very large, well-proportioned, stiff. Standards

domed, somewhat floppy, 4 × 3 inches, bright lavender, margins waved. Falls almost horizontal, 3 × 2½ inches, bright violet-purple, margins paler, haft brownish. Beard white, upper half of hairs yellow. Flowering for sixteen days from June 10. Raised and sent by Major F. C. Stern.

ALBIERO.—Vigorous and free of increase, with erect foliage 24 inches high. Flower stems 38 inches high, erect, 8-flowered, branches short. Flowers very close, very large, well-proportioned, stiff. Standards domed, 3½ × 2½ inches, dull lavender, base yellowish. Falls almost horizontal, 2½ × 2½ inches, bright violet-purple, margins dull lavender, veins on haft brownish. Beard white, upper half yellow. Flowering for twelve days from June 10. Raised, 1927, and sent by Messrs. Bunyard, Maidstone.

The following varieties have been relegated to the General Collection :

DOLPHIN : 20 inches ; May.
DU GUESCLIN : 27 inches ; May-June.
HYPERION : 32-36 inches ; May-June.
LEONE TRENANCE : 24-26 inches ; May-June.
MOPSA : 36 inches ; May-June.
NEREUS : 32-36 inches ; May-June.
ORIFLAMME : 30-32 inches ; May-June.
PROSPERO : 36 inches ; June.
SPEED : 36 inches ; May-June.

CLASS IV b.

Maisie Low, A.M. 1932.—Vigorous and of rapid increase, foliage erect, 22 inches high. Flower stems 36 inches, with 8 to 10 rather closely placed flowers, branches short. Flowers large, well-proportioned, stiff. Standards domed, 2½ × 2½ inches, waved at margins, rich violet-blue. Falls drooping, 2½ × 2½ inches, rich deep violet-purple, velvety. Beard blue, tips orange. Flowering for fifteen days from June 1. Raised by Messrs. Lowe & Gibson, and sent by Mr. L. A. Lowe.

The following varieties have been added for future judgment :

ROYAL RUTH (Gottschall). PRAETOR (Dykes).

The following varieties have been relegated to the General Collection :

AUTUMN : 29 inches ; May.
KEDRON : 32 inches ; June.
TIMUR : 28 inches ; June.
WISCONSIN : 38 inches ; May-June.

CLASS IV c.

THEL.—Vigorous and of rapid increase with erect foliage, 22 inches high. Flower stems erect, 36 inches, 7-flowered, branches short. Flowers large, well-proportioned, stiff. Standards cupped, somewhat floppy, 2½ × 2½ inches, pale silvery bluish. Falls straight-hanging, 2½ × 2½ inches, pale pinkish mauve, margins paler, veins reddish brown on haft. Beard white, tips bronzy yellow. Flowering for two weeks from June 10. Raised and sent by Mr. B. R. Long, Maidstone. (Imperator × Olympus.)

The following varieties have been relegated to the General Collection :

EMBER : 40 inches ; June.
GERMAINE LE CLERC : 32 inches ; May-June.
HAKADOR : 34 inches ; May-June.
MRS. F. C. STERN : 28 inches ; May-June.
ROBIN : 30 inches ; May-June.
SHREWSBURY : 28 inches ; June.

CLASS IV d.

The following varieties have been added for future judgment :

NAIROBI (Pilkington). DR. AYRES No. 2 (Ayres).

The following varieties have been relegated to the General Collection :

ARGUS : 24 inches ; May-June.
KIRMAN : 24-30 inches ; May-June.

CLASS V *a*.

Lady Charles Allom, A.M. 1932.—Described, R.H.S. JOURNAL, 58, p. 136.

AQUARELLE.—Vigorous and of rapid increase, with erect foliage, 24 inches high. Flower stems 32 inches, zig-zag, 9-flowered, branches short. Flowers of medium size, stiff, well-proportioned. Standards domed, $2\frac{1}{2} \times 1\frac{7}{8}$ inches, pale lavender-blue, margins waved. Falls straight-hanging, paler at the beard. Beard pale yellow. Flowering from June 8. Raised and sent by the Orpington Nursery Co. Introduced 1929.

The following varieties have been added for future judgment :

PEITHO (Dykes).

CALIXA (Dykes).

The following varieties have been relegated to the General Collection :

AQUAMARINE : 24 inches ; May-June.

CHARMIAN : 18 inches ; May.

PALLIDA, KULAN TITH : 38 inches : May-June.

PORCELAIN : 36 inches ; May-June.

SHIRAZ : 24 inches ; May-June.

SIRENE : 32 inches ; June.

VIOLA : 28 inches ; May-June.

CLASS V *b*.

Sapphire, A.M. 1932.—Described, R.H.S. JOURNAL, 55, p. 137.

The following varieties have been relegated to the General Collection :

CYMBELINE : 26 inches ; May.

PENGE : 36 inches ; May-June.

CLASS V *c*.

THAIS.—Plant vigorous, of rapid increase, with erect foliage, 26 inches high. Flower stems 42 inches, erect, branches very short, 8-flowered. Flowers large, very close, stiff, well-proportioned. Standards domed, $2\frac{3}{4} \times 2\frac{3}{8}$ inches, with recurved and waved margins, rosy lilac. Falls straight-hanging, $2\frac{1}{2} \times 2\frac{1}{2}$ inches. Beard white, apex of hairs yellow. Flowering for sixteen days from June 12. Raised and sent by Messrs. Cayeux et le Clerc. Introduced 1926.

CLASS V *d*.

The following variety has been added for future judgment :

WALTER GODFREY (Dykes).

The following varieties have been relegated to the General Collection :

ATROPURPUREA : 24 inches ; May-June.

BOUREM : 24-26 inches ; June.

CLASS VI *a* (1).

The following variety has been added for future judgment :

NOURA (Dykes).

The following varieties have been relegated to the General Collection :

HARPALION : 42 inches ; June.

PALEMON : 36 inches ; June.

QUAKER LADY : 36 inches ; May-June.

CLASS VI *a* (2).

The following varieties have been added for future judgment :

ONTARIO (Pilkington).

QUERIDA (Mitchell).

The following variety has been relegated to the General Collection :

MRS. W. CUTHBERTSON : 32 inches ; May-June.

CLASS VI *b*.

The following varieties have been added for future judgment :

BRUNOLD (Stern).

BURMAH (Pilkington).

The following variety has been relegated to the General Collection :

ARLINGTON : 36 inches ; June.

CLASS VI c (1).

Miss Grace Sturtevant, F.C.C. 1932.—Vigorous and of rapid increase, with erect, glaucous-green foliage, 24 inches high. Flower stems 42 inches, erect, 10-flowered, branches long. Flowers large, closely arranged, well-proportioned, stiff. Standards cupped, with waved margins, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, dull brownish mahogany base yellowish. Falls straight-hanging, 2×2 inches, rich deep velvety purple-maroon, veins on haft distinct. Beard very conspicuous, deep orange. Flowering for three weeks from June 6. Raised by the late Mr. A. J. Bliss and sent by Mr. B. R. Long. Introduced 1926.

MRS. HAMILTON ROWAN—Vigorous, of rapid increase. Foliage erect, 22 inches high. Flower stems 42–48 inches, erect, somewhat zig-zag, 6-flowered, branches short. Flowers large, stiff, well-proportioned. Standards domed, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, bright smoky plum-purple, base yellowish. Falls straight-hanging, $2\frac{3}{4} \times 2\frac{1}{2}$ inches, rich velvety reddish plum, veins brownish on yellow at haft. Beard very conspicuous, orange. Flowering for sixteen days from June 6. Sent by Dr. W. McLean Ayres, Cincinnati, Ohio, U.S.A.

NÈNE.—Plant vigorous, of rapid increase, with erect foliage, 22 inches, glaucous-green. Flower stems 38 inches, erect, 10-flowered, branches of medium length. Flowers very large, stiff, well-proportioned. Standards domed, $3\frac{1}{2} \times 3$ inches, dull smoky plum-purple, base yellowish. Falls straight-hanging, $3\frac{1}{2} \times 2\frac{3}{4}$ inches, rich velvety plum-purple, veins distinct, brownish on yellow at haft. Beard dull orange. Flowering for twelve days from June 12. Raised and sent by Messrs. Cayeux et le Clerc. Introduced 1928.

The following variety has been added for future judgment :

KAFFIR (Pilkington).

The following varieties have been relegated to the General Collection :

ABENDA : 36 inches ; June.

CAYLUS : 24–30 inches ; June.

COLONEL CANDELOT : 34 inches ; June.

DUSKY MAID : 26 inches ; June.

LURIDA : 16 inches ; May–June.

OLYMPUS : 36 inches ; June.

REVERIE : 36–38 inches ; June.

CLASS VI c (2).

ROMULUS.—Vigorous and of rapid increase, with erect foliage, 20 inches. Flower stems 32 inches, erect, somewhat zig-zag, 7-flowered, branches short. Flowers large, stiff, well-proportioned. Standards domed, $2\frac{3}{4} \times 2\frac{3}{4}$ inches, dull smoky old gold faintly flushed purple. Falls drooping, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, rich reddish plum-purple, margins paler, veins on haft distinct, brownish. Beard yellow, tips of hairs bronze. Flowering for fourteen days from June 6. Raised and sent by Messrs. Cayeux et le Clerc.

OPHELIA.—Plant vigorous, and of rapid increase. Foliage erect, 24 inches. Flower stems 30 inches, erect, 6-flowered, branches very short. Flowers of medium size, stiff, well-proportioned. Standards domed, $2\frac{1}{2} \times 1\frac{1}{2}$ inches, dull old gold flushed lilac, veins on haft brownish. Falls straight-hanging, often twisted, creamy white flushed electric blue, margins deep yellow ; veins yellow. Beard bright orange. Flowering two weeks from June 6. Raised by Messrs. Cayeux et le Clerc and sent by them and Mr. B. R. Long. Introduced 1925. Distinct from variety of this name in Class II.

The following variety has been added for future judgment :

KING MIDAS (Mead).

The following variety has been relegated to the General Collection :

IRIS 218 : 28 inches ; May–June.

CLASS VII a.

The following varieties have been added for future judgment :

CANADA (Pilkington).

AUSTRALIA (Pilkington).

CLASS VII b.

THRUDWANG.—Plant vigorous, of rapid increase. Foliage 18–20 inches, erect. Flower stems 32 inches, erect, zig-zag, 7-flowered, branches very short. Flowers

large, stiff, well-proportioned. Standards domed, with waved margins, $2\frac{1}{2} \times 2$ inches, pale yellow, narrowly edged purple with occasional purple streaks. Falls drooping, $2 \times 2\frac{1}{2}$ inches, deep rich velvety plum-purple. Beard yellow. Flowering from June 10. Raised by Messrs. Goos & Koenemann and sent by Mr. B. R. Long. Introduced 1926.

CLASS VII c.

The following variety has been relegated to the General Collection :

IDION : 24 inches ; June.

CLASS VII d.

GIRARDON.—Vigorous, of rapid increase, with erect, bright glaucous-green foliage, 20 inches high. Flower stems 33 inches, erect, somewhat zig-zag, 8-flowered, branches of medium length. Flowers large, well-proportioned, stiff. Standards domed, notched, with waved margins, $2\frac{1}{2} \times 1\frac{1}{2}$ inches, rich dull yellow. Falls drooping, $2 \times 1\frac{1}{2}$ inches, bright brownish purple, margins yellow. Beard deep yellow. Flowering for twelve days from June 13. Raised and sent by Messrs. Cayeux et le Clerc. Introduced 1929.

The following varieties have been relegated to the General Collection :

CHELLES : 24 inches ; June.

DARIUS : 30 inches ; June.

GLITTER : 26 inches ; June.

SPECTABILIS : 28 inches ; June.

CLASS VIII a.

Bezan, A.M. 1932.—Plant vigorous, of rapid increase, with erect, glaucous-green foliage, 20 inches high. Flower stems 33 inches, erect, zig-zag, 7-flowered, branches of medium length. Flowers large, well-proportioned, stiff. Standards domed, with waved margins, $2\frac{1}{2} \times 2$ inches, bright rich yellow, base old gold. Falls almost horizontal, $2 \times 1\frac{1}{2}$ inches, creamy white, edged pale yellow. Beard orange. Flowering from June 12 for two weeks. Raised and sent by the Orpington Nursery Co. Introduced 1929. Sunset (*ochracea coerulea*) \times Shekinah.

NICOLAS POUSSIN.—Vigorous, of rapid increase, with erect foliage, 24 inches high. Flower stems 32 inches, erect, zig-zag, 7-flowered, branches short. Flowers large, well-proportioned, stiff. Standards domed, $2\frac{1}{2} \times 2\frac{1}{2}$ inches, bright yellow, base darker, veined deep brown. Falls almost horizontal, $2\frac{1}{2} \times 2$ inches, creamy white, margins flecked yellowish brown. Beard white, apex of hairs yellow-brown. Flowering for two weeks from June 14. Raised and sent by Messrs. Cayeux et le Clerc. Introduced 1929.

The following variety has been added for future judgment :

CATHAY (Wallace).

The following varieties have been relegated to the General Collection :

MANITOBA : 33 inches ; June.

YELLOW HAMMER : 18 inches ; May.

CLASS VIII b.

The following varieties have been added for future judgment :

ALIQUIPPA (Hall).

FLAVILLA (Dykes).

BOBBINGCOURT (Dykes).

RAYO DE SOL (Mitchell).

The following varieties have been relegated to the General Collection :

FLAVESCENS : 28 inches ; May-June.

SHEKINAH : 36 inches ; June.

YELLOW MOON : 26 inches ; June.

UNCLASSIFIED VARIETIES.

The following varieties are planted with the Standard Collection for future judgment, but are not yet assigned to their proper classes :

ANDROMEDA (Bunyard).

CEBALIERI (Bunyard).

CELAENO (Bunyard).

ALHENA (Bunyard).

IZAR (Bunyard).

MEROPE (Bunyard).

MESARTIM (Bunyard).

THUBAN (Bunyard).

ENGLISH IRISES AT WISLEY, 1929-1932.

NINETY-NINE stocks and nearly as many varieties were received at Wisley for trial in 1929 and 1931. Six bulbs of each were planted in moist soil, where they made excellent growth. The flowers were judged on July 3, 1930, and on July 6, 1932—on the latter date by the Iris Joint Committee.

AWARDS, DESCRIPTIONS,* AND NOTES.

Standards and Falls White or nearly so.

AWARDS.

Mer de Glace, A.M. July 3, 1930. Sent by Messrs. van Tubergen.

Mont Blanc, A.M. July 3, 1930. Sent by Messrs. van Tubergen.

MER DE GLACE (van Tubergen), **A.M.**—See JOURNAL R.H.S. 56, p. xxxvii.

MONT BLANC (van Tubergen), **A.M.**—See JOURNAL R.H.S. 56, p. xxxvii. Also sent by Messrs. van Waveren, Barr, and Longstaff.

MISS ILMA WATSON (Watson).

MRS. BARCLAY (Dobbie).—Distinct from Messrs. van Waveren's stock under this name.

DORA (van Tubergen).—Standards occasionally blotched blue; falls creamy-white.

PRINCESS IRENE (van Waveren).—Standards occasionally blotched pale purple.

BLANCHE SUPERBE (van Waveren).—Falls whiter than in 'Princess Irene,' texture flimsy.

WITHINGTON BRIDE (Watson).—Falls very pale lavender-white.

BAVARIA (van Waveren).—Standards blotched pale blue; falls creamy-white.

Standards and Falls Bluish-white blotched Purple.

LORENZO DA MEDICI (van Tubergen).

Standards and Falls Lavender.

AWARD.

Lucinda, A.M. July 6, 1932. Sent by Messrs. van Tubergen, van Waveren, Barr, Longstaff.

SPILHAGEN (Longstaff).

CLARA BUTT (van Tubergen).—Of rather darker shade than 'Spilhagen.'

TRAFALGAR (van Waveren, Dobbie).—Standards with small pale blue blotches.

PRINCE ALBERT (Longstaff).—Very similar to 'Trafalgar,' but somewhat paler.

MRS. ROSE WATSON (Watson).—Pale silvery-lavender self.

LUCINDA (van Tubergen, van Waveren, Barr, Longstaff), **A.M.**—2½ feet; pale silvery-lavender streaked with pale blue, self.

PERLE DE JARDINS (van Tubergen).—Bluish-white blotched pale blue, self.

ELECTRA (van Waveren).—Silvery-lavender; standards blotched violet.

GRAND VAINQUEUR (van Waveren).—Lavender blotched lavender-violet.

GRAND LILAS (van Waveren).—Pale lavender blotched rosy-lavender, self.

Flowers Lilac.

VIOLET QUEEN (Longstaff).—Pale silvery-lavender-mauve self.

SUNSET (van Waveren, Dobbie, Barr).—Rather darker than 'Violet Queen.'

ROSA BELLA (Longstaff).—Pale silvery-mauve self.

VICEROY (van Waveren).—Pale lilac; falls blotched darker.

LILACEA (van Waveren).—Rosy-lilac blotched darker.

* Where no descriptive note is given, the heading is to be taken as sufficient.

Flowers Rosy-mauve.**AWARD.**

Almona, H.C. July 6, 1932. Raised and sent by Messrs. van Tubergen. Also sent by Messrs. Barr.

TRICOLOR (van Tubergen, van Waveren, Dobbie).—Rosy-mauve standards ; falls lavender-mauve.

ALMONA (van Tubergen, Barr), **H.C.**—Standards pale royal-purple ; falls pale lavender-violet.

DUKE OF RICHMOND (van Waveren).—Royal-purple self.

Standards Lavender-violet ; Falls Lavender.

DUKE OF CLARENCE (van Tubergen, Barr).—Falls spotted violet-purple on haft.

FRANS HALS (van Waveren).—Falls pale lavender-blue.

PHILOMELA (van Waveren).—Somewhat darker than 'Frans Hals.'

HUGO DE GROOT (van Waveren).—Falls paler than 'Philomela.'

Lavender-violet Selfs.

SAPPHO (van Tubergen, Longstaff).—Standards and falls blotched darker.

JAMES DEWAR (van Waveren, Dobbie).—Falls blotched darker.

Blue-purple Shades.**AWARDS.**

Giant, A.M. July 3, 1930. Sent by Messrs. van Tubergen.

Princess Juliana, A.M. July 3, 1930. Sent by Messrs. van Tubergen.

Emperor, H.C. July 6, 1932. Sent by Messrs. van Tubergen.

NIMROD (van Waveren, Barr).—Falls blotched darker.

COULEUR CARDINAL (Dobbie, van Waveren).

PRINCE OF WALES (van Tubergen, van Waveren, Dobbie, Barr).—Standards somewhat paler than falls.

BARHOS (Longstaff).—Standards blotched darker.

GIANT (van Tubergen), **A.M.**—See JOURNAL R.H.S. 56, p. xxxvii. Also sent by Messrs. Dobbie, van Waveren ; and as 'Blue Giant' by Messrs. Barr.

DUCHESS OF YORK (van Tubergen, Barr).—Rich violet-purple ; falls paler.

CORNELIA (van Waveren).—Much like 'Duchess of York,' but with darker falls.

PRINCESS JULIANA (van Tubergen), **A.M.**—See JOURNAL R.H.S. 56, p. xxxvii. Also sent by Messrs. van Waveren, Dobbie, Barr.

KING OF THE BLUES (van Tubergen, van Waveren).—Standards and falls blotched darker.

TRIUMPH (van Tubergen).—Of a darker shade than 'King of the Blues.'

SURPRISE (van Waveren, Dobbie).—Standards rich violet-purple blotched darker ; falls somewhat paler.

LA ETUIT (van Tubergen).—Somewhat darker than 'Surprise.'

BLUE SUPERB (van Tubergen).—Standards purple ; falls violet-blue blotched deep violet.

JULIUS (van Tubergen).—Much like 'Blue Superb,' but with somewhat pale falls.

EMPEROR (van Tubergen), **H.C.**—Purplish-violet self, blotched darker.

RUBY (van Waveren).—Of a somewhat darker shade than 'Emperor.'

White speckled Rosy-purple.**AWARDS.**

Rosa Bonheur, H.C. July 6, 1932. Sent by Messrs. Barr.

de La Martine, H.C. July 6, 1932. Sent by Messrs. Dobbie.

ROSA BONHEUR (Barr), **H.C.**—White heavily blotched rosy-purple.

DE LA MARTINE (Dobbie), **H.C.**—Less colour on the haft than the last, otherwise very similar.

LAMARTINE (van Tubergen).—Of a paler shade than the foregoing.

MRS. BARCLAY (van Waveren).—Much paler than 'Lamartine.'

KOH-I-NOOR (van Waveren, Dobbie).—Rather darker than others of this colour.

Red-purple Shades.

AWARDS.

Thackeray, A.M. July 6, 1932. Sent by Messrs. van Waveren.

Mirabeau, H.C. July 3, 1930. Sent by Messrs. van Tubergen.

Sir Wm. Mansfield, C. July 6, 1932. Sent by Messrs. Dobbie, Longstaff, van Waveren.

MARGOT (Longstaff).—Middle of falls much paler.

BEETHOVEN (Barr).—Standards of a deeper shade than falls.

MIRABEAU (van Tubergen), **H.C.**—Described JOURNAL R.H.S. 56, p. xxxvii. Also sent by Messrs. van Waveren.

PURPLE QUEEN (van Waveren).—Standards blotched darker; falls pale at the middle.

LORD PALMERSTON (van Waveren).—Standards very dark red-purple; falls paler.

THACKERAY (van Waveren), **A.M.**—Standards and falls deep reddish-purple, blotched darker.

PROSPERINE (van Tubergen).—Standards blotched purple-maroon; falls velvety, blotched darker.

SIR WM. MANSFIELD (Dobbie, Longstaff, van Waveren), **C.**—Flowers of a darker and richer shade than foregoing.

STOCKS AT WISLEY, 1932.

WE have grouped the plants grown in the trial into four main groups according to their habit, and especially according to the arrangement of the flowers. Group I includes the Ten-week Stocks, Group II the Nice and Mammoth Stocks, Group III the Column Stocks, Group IV the East Lothian Stocks.

With few exceptions the plants of the last group did not flower till very late, and as a whole this section of the trial, under the conditions of sowing and growing adopted, did not in the present season prove satisfactory.

Unfortunately in some instances the names under which the varieties were received do not always indicate the group to which the variety belongs, and in some instances are misleading. This will be apparent by a perusal of the following notes. The East Lothian Stocks are not referred to further.

GROUP I. Ten-week Stocks.

The varieties in this group have side branches as strongly developed as the central stem, so that the spikes all reach to about the same height.

These varieties may be subdivided according to the type of growth and height.

In GROUP Ia (fig. 58) the very compact plants are 10 to 12 inches high, and the spikes are very compact.

In GROUP Ib (fig. 59) the plants are taller, up to 18 inches, and the compact spike longer (up to 8 inches).

In GROUP Ic (fig. 60) the plants are still taller (up to 24 inches) and looser in habit, the spike rather loose, and the flowers larger.

GROUP II. Nice and Mammoth Stocks.

The varieties placed in Group II have a pyramidal habit with the central spike longer than the side branches. Two sub-groups may be distinguished.

In GROUP IIa (fig. 61), usually about 20 inches in height, the flowers are densely arranged on the spike.

In GROUP IIb (fig. 62) the plant is somewhat taller, the branching looser, and the flowers are more loosely arranged.

GROUP III. Column Stocks.

The varieties in this group do not branch, the plants reach about 30 inches in height, the flowers are large, and the spike may be 12 to 14 inches in length (fig. 63).

Including the eighteen East Lothian varieties, 473 packets of seed were received for trial. The seed was sown in pots in a cool greenhouse on April 8, 1932. After pricking out, the plants were put out 1 foot apart in rows 18 inches apart on May 31. Flowering commenced with the Ten-week Stocks in early July, the latest to flower being those in the Mammoth and Column groups. The Floral Committee examined the trial on several occasions, and the plants were judged on July 13 and August 5.

The Stocks were on the whole remarkably true to type all through, and the greatest difference was in the number of doubles contained. Where one stock of a variety has been selected by the Judges for award the award is generally made to the one containing most doubles.

AWARDS, DESCRIPTIONS, AND NOTES.

N.B.—Accepted names of varieties to which awards have been made are printed in thick type; names of varieties failing to obtain awards are in small capitals; names in small type are synonyms of the accepted name immediately preceding.

Flowers white.

GROUP Ia.

SNOWFLAKE (Heinemann).

GROUP Ib.

Ten-week White, H.C. Aug. 5, 1932. Sent by Messrs. Watkins & Simpson of Drury Lane, London, W.C., and by Messrs. Dobbie of Edinburgh.

TEN-WEEK WHITE (W. H. Simpson, Waller-Franklin, Heinemann).

Dwarf Bedding White, H.C. Aug. 5, 1932, from Messrs. Dobbie.—Flower spikes shorter than in last.

DWARF TEN-WEEK WHITE (Morris, Ferry-Morse, Benary).—Dwarfer.

TEN-WEEK LARGE-FLOWERED WHITE (Hurst).—Taller and with larger flowers.

GROUP Ic.

Snowdrift, A.M. Aug. 5, 1932. Raised by Messrs. Watkins & Simpson and sent by Mr. W. H. Simpson of Monument Road, Birmingham.

SNOWDRIFT, H.C., sent by Messrs. Clucas of Ormskirk, and by Mr. A. Dawkins of King Street, Chelsea.

SNOWDRIFT (Watkins & Simpson, Ferry-Morse, Waller-Franklin).

Snow Queen, H.C., sent by Messrs. Barr, Covent Garden, W.C.

Princess Alice and **Mont Blanc** of Messrs. Macdonald, Santa Maria, California, U.S.A., were also **H.C.** Stocks of **Snowdrift**.

Madame Rivoire (Rivoire).

Giant Perfection White (Dobbie).

GROUP IIa.

Princess Alice, A.M. Aug. 5, 1932. Sent by Messrs. Watkins & Simpson.—Of rather looser habit than fig. 61.

PRINCESS ALICE (Harrison, Kelway, Waller-Franklin, Heinemann).

MONT BLANC (Watkins & Simpson, Dobbie, Waller-Franklin, Harrison, Benary, Ferry-Morse).—More compact than 'Princess Alice.'

Merveille d'Antibes (Rivoire).—Very irregular in time of flowering.

Giant Perfection White, H.C. Aug. 5, 1932. Sent by Messrs. Harrison of Leicester.—Looser and less branched than fig. 61.

GIANT PERFECTION WHITE (Morris).

PRINCE BISMARCK WHITE (Heinemann).—Branching looser than in fig. 61.

DRESDEN PERPETUAL WHITE (Benary).—Taller and more pyramidal than fig. 61.



FIG. 58.—TYPE OF 'TEN-WEEK' STOCK.
(Group Ia.)

[To face p. 208.

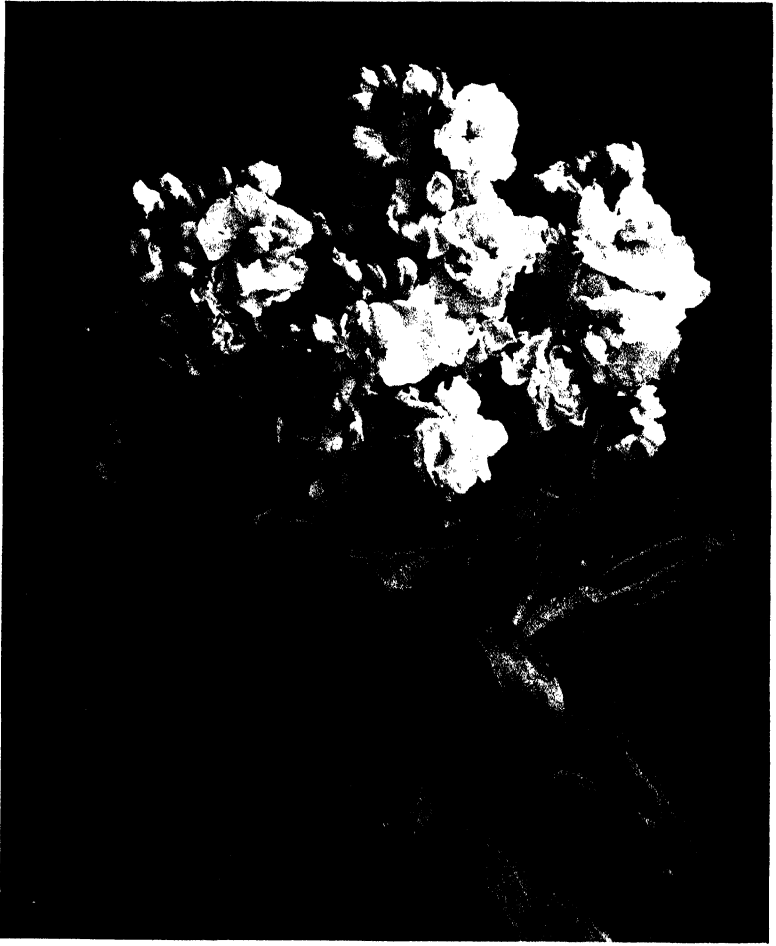


FIG. 59. - TYPE OF 'TEN-WEEK' STOCK.
(Group Ib.)



FIG. 60.—TYPE OF 'TEN-WEEK' STOCK.
(Group Ic.)



FIG. 61.—TYPE OF 'NICE' OR 'BEAUTY' STOCK.
(Group IIa.)

[To face p. 209.

GROUP IIB.

GIANT IMPERIAL WHITE (Waller-Franklin).

Imperial White (Ferry-Morse).

GIANT IMPERIAL WHITE IMPROVED (Waller-Franklin).—Taller than last; contained cream rogue.

Santa Maria (Clucas, Macdonald).—The first contained cream rogues.

TALL LARGE-FLOWERED DOUBLE WHITE (Carter).—Dwarfer.

GROUP III.

Column White, H.C. Aug. 5, 1932, from Messrs. Watkins & Simpson.

Giant Perpetual Excelsior Column White, **H.C.**, from Messrs. Benary of Erfurt.

Monarch Giant White, **H.C.**, from Messrs. Carter of Raynes Park.

Giant Perpetual Column White (Morris).

Giant Perpetual Excelsior White (Heinemann).

Everest (Harrison).

Gloriosa White (Clucas).

Flowers cream.

GROUP Ia.

RHEINGOLD (Heinemann).

GROUP Ib.

Ten-week Canary Yellow, H.C. Aug. 5, 1932, from Mr. W. H. Simpson.

Dwarf Ten-week Yellow, **H.C.**, from Messrs. Ferry-Morse.

Superfecta Primrose, **H.C.**, from Messrs. Cutbush of Barnet.

Ten-week Cream (Waller-Franklin).

Dwarf Large-flowering Ten-week Canary Yellow (Benary).

Dwarf Bedding Yellow (Dobbie).

Erfurt Ten-week Canary Yellow (Heinemann).

Large-flowering Ten-week Yellow (Dobbie).

Ten-week Aurora (Waller-Franklin).

GROUP IIa.

DRESDEN PERPETUAL TEN-WEEK CANARY YELLOW (Heinemann, Benary).

GROUP IIB.

Mammoth Ten-week Canary Yellow, A.M. Aug. 5, 1932, from Messrs. Watkins & Simpson.

Nice Canary Yellow (Ferry-Morse).

Monte Carlo (Clucas, Johnson, Waller-Franklin).

Early Mammoth Aurora (Barr).—Not true to name.

Nice Giant Canary Yellow, A.M. Aug. 5, 1932, from Messrs. Benary.—Later, less branched, and taller than last.

Early Giant Imperial Canary Yellow, **A.M.**, from Messrs. Macdonald.

Bismarck Canary Yellow (Heinemann).

Tall Large-flowered Double Ten-week Golden (Carter).

Perpetual Branching Canary Yellow (Macdonald).

Giant Imperial Canary Yellow (Ferry-Morse, Waller-Franklin).

Giant Imperial New Canary Yellow (Waller-Franklin).—Contained magenta rogues.

GIANT PERFECTION YELLOW (Dobbie).—Dwarfer and less branched.

Perpetual Branching Canary Yellow (Creole), **H.C.** Aug. 5, 1932. Raised and sent by Messrs. Waller-Franklin.

Perpetual Canary Yellow (Ferry-Morse).

Flowers blush-pink on white.

GROUP Ia.

MRS. MARY TEICHER (Heinemann).

GROUP Ib.

Peach Blossom, H.C. Aug. 5, 1932. Raised and sent by Messrs. Waller-Franklin, Guadalupe, California.

PEACH BLOSSOM (Dobbie).

APPLE BLOSSOM (Watkins & Simpson, W. H. Simpson, Ferry-Morse).—Taller.

Dresden Perpetual Ten-week Apple Blossom (Heinemann).—Contained cream and rose rogues.

TEN-WEEK LARGE-FLOWERED ROSE-TINTED YELLOW (Hurst).—Dwarf, tinted cream.

RITA BLOSSEY (Heinemann).—Darker.

GROUP IIa.

LA FRANCE (Waller-Franklin).

GROUP IIb.

Almond Blossom, H.C. Aug. 5, 1932, from Messrs. Watkins & Simpson.

Apple Blossom, **H.C.**, from Messrs. Macdonald and Messrs. Waller-Franklin.

Apple Blossom (Benary, Ferry-Morse).—Distinct from Apple Blossom of Group Ib.

GROUP III.

Mammoth Perpetual Excelsior, White with Rose, H.C. Aug. 5, 1932, from Messrs. Heinemann of Erfurt.

Flowers flesh-pink.

GROUP Ib.

APPLE BLOSSOM (Hurst).—One foot high, very compact.

TEN-WEEK FLESH (Dobbie, Waller-Franklin).—Taller and duller.

DWARF TEN-WEEK FLESH (Morris).—Taller than last.

GROUP IIa.

Beauty of Nice, A.M. Aug. 5, 1932, from Messrs. Watkins & Simpson.

BEAUTY OF NICE, **H.C.**, from Messrs. Benary.

BEAUTY OF NICE (Dobbie, Dawkins, Clucas, Harrison, Waller-Franklin, Macdonald, W. H. Simpson).

Souvenir de Nice, **H.C.**, from Messrs. Rivoire, the raisers of this variety.

Nice Flesh Pink (Ferry-Morse).

Dresden Perpetual Flesh (Benary).

Perpetual Branching Flesh (Waller-Franklin).

Giant Imperial Flesh, A.M. Aug. 5, 1932, from Messrs. Waller-Franklin, the raisers [**A.M.** 1922].—Less branched than last.

Giant Perfection Flesh (Morris).—Contained magenta rogues.

Prince Bismarck Flesh (Heinemann, Macdonald).

Gloriosa Flesh (Clucas).

Flowers rose-pink.

GROUP Ia.

ROSE TEICHER (Heinemann).

GROUP Ib.

TEN-WEEK ROSE (Watkins & Simpson).

Ten-week Large-flowered Rose (Hurst).

DWARF BEDDING ROSE (Dobbie).—Rather dwarfier.

TEN-WEEK BRIGHT PINK (Waller-Franklin).—Dwarfer.

Dwarf Ten-week Bright Pink (Ferry-Morse).

Dwarf Ten-week Rose (Kerr).

Dwarf Large-flowered Ten-week Rose (Benary).

Giant Perpetual Excelsior Pink (Heinemann).—Wrongly named.

DWARF TEN-WEEK BRILLIANT ROSE (Benary).—Of softer shade.

GROUP Ic.

ABUNDANCE (Watkins & Simpson, Dobbie, Waller-Franklin, W. H. Simpson, Benary, Macdonald).—Late to flower.

Abundance rouge (Rivoire, the raiser).

GROUP IIa.

Nice Bright Pink, A.M. Aug. 5, 1932, from Messrs. Ferry-Morse of San Francisco.

Large-flowering Dwarf Ten-week Rose (Morris).

Giant Imperial Rose (Waller-Franklin, Macdonald).

Prince Bismarck Rose (Heinemann).

Bismarck Improved Rose (Macdonald).

IMPERIAL ROSE PINK (Ferry-Morse).—Darker.

DRESDEN PERPETUAL ROSE (Heinemann).—Darker.

GIANT PERFECTION ROSE (Dobbie, Clucas, Morris, Dawkins).—Less branched.
Perpetual Branching Rose (Waller-Franklin).

GROUP IIB.

PERPETUAL BRANCHING ROSE-PINK (Ferry-Morse).
Perpetual Branching Rose (Macdonald).

GROUP III.

GIANT PERPETUAL EXCELSIOR COLUMN ROSE, H.C. Aug. 5, 1932, from Messrs. Benary.
Giant Perpetual Column Rose (Morris).
Giant Perpetual Excelsior Rose (Heinemann).
Gloriosa Rose (Clucas).

Flowers rose.

GROUP IB.

TEN-WEEK DEEP ROSE, H.C. Aug. 5, 1932, from Messrs. Waller-Franklin.
Dwarf Ten-week Rose (Ferry-Morse).
Ten-week Carmine Rose (W. H. Simpson).
Large-flowering Ten-week Carmine (Dobbie).
Erfurt Ten-week Carmine (Heinemann).
Superfecta Deep Rose (Cutbush).

GROUP IIB.

SALMON KING, A.M. Aug. 5, 1932, from Messrs. Clucas.
SALMON KING, H.C., from Messrs. Waller-Franklin and Messrs. Barr.
SALMON KING (Ferry-Morse, Macdonald).
Salmon Beauty, H.C., from Messrs. Ryder.
IMPERIAL DEEP ROSE AND SALMON (Ferry-Morse).—Darker.

Flowers salmon-pink.

GROUP IC.

BELLE DE NAPLES, H.C. Aug. 5, 1932, from Messrs. Waller-Franklin.—Pale.
BELLE DE NAPLES (Macdonald, Ferry-Morse).
Nice Large-flowering Giant Old Pink (Benary).
MAMMOTH OLD ROSE (Watkins & Simpson, W. H. Simpson, Barr).—Brighter.
Giant Perfection Old Rose (Clucas).

Flowers carmine-pink.

GROUP IB.

DWARF LARGE-FLOWERING TEN-WEEK COPPERY CARMINE (Benary).—Contained darker rogues.
TEN-WEEK CARMINE PINK (Waller-Franklin).—Brighter.
Large-flowering Ten-week Brilliant Rose (Dobbie).
TEN-WEEK COPPERY CARMINE (Waller-Franklin).—Bright.

Flowers rosy carmine.

GROUP IB.

TEN-WEEK BRIGHT ROSE (Watkins & Simpson, W. H. Simpson).—More leafy at base than in fig. 59.
Tall Ten-week Rosy Scarlet (Carter).
Dresden Perpetual Bright Purple Carmine (Benary, Heinemann).
Superfecta Copper (Cutbush).

Flowers old rose.

GROUP IB.

TEN-WEEK OLD ROSE (Waller-Franklin).
Dwarf Ten-week Old Rose (Ferry-Morse).
TEN-WEEK LARGE-FLOWERED PURPLE BROWN (Hurst).—Looser in habit, dull deep old rose.

GROUP IC.

SOLEIL DU CAP MARTIN (Rivoire).—Late; soft dull old rose.
ÎLE DE BEAUTÉ (Rivoire).—Dull deep old rose. Contained lavender rogues.

GROUP IIb.

ROQUEBRUNE (Rivoire, raiser).

Giant Imperial Old Rose (Waller-Franklin, Ferry-Morse, Macdonald).

Giant Imperial Vieux Rose (Barr).

GROUP III.

CHAMPION COLMUN COPPER SCARLET (Benary).—Pale old rose.

MAMMOTH PERPETUAL EXCELSIOR, PURPLE WITH GOLD (Heinemann).—Deep, dull.

Flowers coppery old rose.

GROUP Ic.

TALL TEN-WEEK RUSSET RED (Carter).—Dull coppery old rose.

GROUP IIb.

BISMARCK ANTIQUE COPPER (Benary).

Tall Large-flowered Antique Copper (Carter).

Giant Imperial Antique Copper (Waller-Franklin, Macdonald, Ferry-Morse, Barr).

Prince Bismarck Coppery Scarlet (Heinemann).

GROUP III.

MONARCH GIANT TEN-WEEK COPPERY SCARLET (Carter).

Mammoth Perpetual Excelsior Coppery Scarlet (Heinemann).

Flowers chamois-pink.

GROUP Ib.

TEN-WEEK CHAMOIS (Watkins & Simpson).

Superfecta Chamois (Cutbush).

GROUP IIb.

Giant Imperial Chamois, A.M. Aug. 5, 1932, from Messrs. Waller-Franklin; H.C. from Messrs. Macdonald.

GIANT IMPERIAL CHAMOIS (Ferry-Morse).

Prince Bismarck Chamois (Heinemann).

Large-flowered Dwarf Ten-week Buff (Morris).

Dresden Perpetual Chamois (Benary, Heinemann).

Salmon Queen, H.C. Aug. 5, 1932, from Messrs. Daniels.—Very much like foregoing, but dwarfer and less branched.

Aurora (Waller-Franklin, Ferry-Morse, Clucas, Benary).

Flowers chamois-rose.

GROUP IIb.

Giant Imperial Chamois-Rose, A.M. Aug. 5, 1932, from Messrs. Waller-Franklin and Messrs. Macdonald.

GROUP III.

Mammoth Perpetual Excelsior Chamois-Rose, A.M. Aug. 5, 1932, from Messrs. Heinemann.

Long-stemmed Champion Column Chamois-Rose with Gold (Benary).

GIANT PERPETUAL EXCELSIOR CHAMOIS-ROSE (Heinemann).—Paler.

Flowers pinkish mauve.

GROUP Ib.

DWARF TEN-WEEK LARGE-FLOWERING LILAC (Benary).

GROUP IIa.

GIANT PERFECTION DELICATE ROSY MAUVE (Watkins & Simpson).—Dwarfer than fig. 61.

QUEEN ALEXANDRA (Watkins & Simpson, Johnson, Benary, Waller-Franklin). Taller than fig. 61.

Flowers rosy mauve.

GROUP IIb.

Heatham Beauty, A.M. Aug. 5, 1932, from Messrs. Watkins & Simpson, the raisers, and Messrs. Ferry-Morse.

HEATHAM BEAUTY, H.C., from Messrs. Macdonald.

HEATHAM BEAUTY (Barr, Clucas, Waller-Franklin).

Prince Bismarck Bright Salmon Pink (Heinemann).

Bismarck Improved Golden Rose, H.C. Aug. 5, 1932, from Messrs. Macdonald. Paler.

Giant Imperial Golden Rose (Kelway, Waller-Franklin, Ferry-Morse).

PINK PERFECTION (Barr).—Dwarfer and of softer shade.

Rose Queen (Waller-Franklin).

Flowers lavender.

GROUP IIa.

Empress Augusta Victoria, A.M. Aug. 5, 1932, from Messrs. Waller-Franklin. Taller and looser than fig. 61.

EMPRESS AUGUSTA VICTORIA (Macdonald, Ferry-Morse, Benary, Heinemann).

Queen of the Belgians (Watkins & Simpson, W. H. Simpson, Barr, Clucas, Dawkins).

Bismarck Improved Lavender, A.M., from Messrs. Macdonald.

Prince Bismarck Silvery Lilac, H.C., from Messrs. Heinemann.

Azure Queen (Daniels).

Nice Giant Light Blue (Benary).

Giant Perfection Silvery Lilac (Dobbie).

Giant Perfection Light Blue (Morris).

Large-flowering Dwarf Ten-week Azure Blue (Morris).

Côte d'Azur (Rivoire).

Nice Lavender (Ferry-Morse).

Giant Imperial Lavender (Waller-Franklin, Ferry-Morse, Macdonald).

VIOLETTE DE PARME (Rivoire).—Darker.

Early Mammoth Parma Violet (Barr).

GROUP IIb.

Ten-week Lavender, A.M. Aug. 5, 1932, from Messrs. Waller-Franklin.

DWARF TEN-WEEK LAVENDER (Ferry-Morse).—Dwarfer and paler.

GROUP III.

GIANT PERPETUAL EXCELSIOR SILVERY LILAC (Heinemann).

Long-stemmed Champion Column Silvery Lilac (Benary).

Giant Perpetual Column Silvery Lilac (Morris).

Flowers lavender-mauve.

GROUP IIa.

GIANT IMPERIAL MAUVE LAVENDER (Waller-Franklin, Macdonald).

Mauve Queen (Daniels).

Flowers rosy lavender.

GROUP Ib.

Ten-week Large-flowered Porcelain Blue (Wallflower-leaved), **H.C.**, from Messrs. Hurst.

KATHE TEICHER (Heinemann).—Dwarfer.

Flowers slate-lavender.

GROUP IIb.

PRESIDENT WILSON (Waller-Franklin).—Dull slaty lavender.

Flowers lilac.

GROUP Ib.

Ten-week Large-flowered Lavender, H.C. Aug. 5, 1932, from Messrs. Hurst.—Dwarfer and more compact than fig. 59.

TEN-WEEK LIGHT BLUE (Watkins & Simpson, W. H. Simpson).—Deep lilac.

Ten-week Large-flowered Light Blue (Hurst, Benary, Dobbie).

Dwarf Bedding Light Blue (Dobbie).

Large-flowering Erfurt Light Blue (Heinemann).

Ten-week Azure Blue (Waller-Franklin).

Dwarf Ten-week Mauve (Ferry-Morse).

GROUP IIb.

Nice Giant Deep Lilac, H.C. Aug. 5, 1932, from Messrs. Hurst.

Bismarck Improved Lilac, **H.C.**, from Messrs. Macdonald.

Tall Large-flowered Ten-week Lilac (Carter).

Giant Imperial Lilac (Waller-Franklin, Ferry-Morse).

CÔTE D'AZUR (Waller-Franklin, Ferry-Morse).—Dwarfer and looser than fig. 62.

May Queen, H.C. Aug. 5, 1932, from Messrs. Ferry-Morse.

MAY QUEEN (Waller-Franklin, Macdonald).

Prince Bismarck Light Blue (Heinemann).

Dresden Perpetual Light Blue (Heinemann, Benary).

GROUP III.

GIANT PERPETUAL EXCELSIOR COLUMN LIGHT BLUE (Benary).

Giant Perpetual Excelsior Light Blue (Heinemann).

Flowers ash mauve.

GROUP IIa.

GIANT PERFECTION ASH GREY (Kerr).

Flowers rosy magenta.

GROUP IIa.

AMERICAN BEAUTY (Waller-Franklin, Macdonald, Ferry-Morse).—Looser than fig. 61. Late.

Flowers magenta.

GROUP Ib.

TEN-WEEK DARK CRIMSON (Watkins & Simpson, W. H. Simpson).

Dwarf Ten-week Scarlet (Kerr).

Dresden Perpetual Blood Red (Heinemann).

RUBY (Heinemann).—Of deeper, duller shade.

DWARF TEN-WEEK CRIMSON (Waller-Franklin, Ferry-Morse).—Taller and looser.

Large-flowering Ten-week Crimson (Dobbie).

TEN-WEEK FIERY SCARLET (Watkins & Simpson, W. H. Simpson).—Brighter and richer in shade.

Dwarf Ten-week Blood Red (Waller-Franklin, Ferry-Morse).

Large-flowering Ten-week Blood Red (Dobbie, Morris, Benary).

Superfecta Scarlet (Cutbush).

Erfurt Ten-week Dark Blood Red (Heinemann).

GROUP Ic.

Nice Crimson, H.C. Aug. 5, 1932, from Messrs. Ferry-Morse.—Bright.

PERPETUAL FIERY BLOOD RED (Ferry-Morse).—Less leafy at base than fig. 60.

GIANT PERFECTION BLOOD RED (Clucas, Dobbie).

Tall Large-flowered Double Ten-week Scarlet (Carter).

Brilliant (Waller-Franklin, Macdonald, Ferry-Morse).

Lloyd George (Waller-Franklin).

Ten-week Brilliant Crimson, H.C. Aug. 5, 1932, from Messrs. Waller-Franklin. Bright magenta.

Crimson King (Watkins & Simpson, Barr, Ferry-Morse, Dobbie).

Giant Perfection Blood Red (Kerr).

Dwarf Ten-week Crimson (Morris).

EARLY GIANT IMPERIAL BLOOD RED (Macdonald, Waller-Franklin).—Later and duller.

Giant Imperial Fiery Blood Red, H.C. Aug. 5, 1932, from Messrs. Macdonald. Later and of richer shade.

GIANT IMPERIAL FIERY BLOOD RED (Waller-Franklin).

PRINCE BISMARCK CRIMSON (Heinemann).—Rather paler than last.

GROUP IIa.

DRESDEN PERPETUAL CRIMSON (Benary).

Giant Perfection Crimson (Morris).

GROUP IIb.

NICE EARLY LARGE-FLOWERING GIANT DARK CRIMSON (Benary).—Late.

GROUP III.

GIANT PERPETUAL EXCELSIOR CRIMSON (Benary, Heinemann).

Giant Perpetual Column Crimson (Morris).

ELSA GRUSSDORF (Heinemann).—Brighter and richer.

Flowers ruby.

GROUP Ic.

SOUVENIR OF MONACO (Clucas, Johnson).—Ruby magenta.

GROUP III.

Giant Perpetual Excelsior Gloria, H.C. Aug. 5, 1932, from Messrs. Heinemann. Dwarfier than fig. 63.

GIANT PERPETUAL EXCELSIOR GLORIA (Benary).

Monarch Giant Ten-week Crimson (Carter).

Gloriosa Blood Red (Clucas).

Giant Crimson (Daniels).

ILLUSION (Waller-Franklin, Benary, Heinemann).

IMPERIAL BLOOD RED (Ferry-Morse).—Brighter than last.

GIANT EXCELSIOR RUBY RED (Waller-Franklin).—Paler than 'Illusion.'

Flowers ruby-purple.

GROUP Ib.

TEN-WEEK LARGE-FLOWERED PURPLE VIOLET (Hurst).

Flowers red-purple.

GROUP Ib.

Ten-week Pansy Violet, H.C. Aug. 5, 1932, from Messrs. Waller-Franklin.—Looser than fig. 59.

Purple Queen (Barr).

Erfurt Ten-week Dark Blue (Heinemann).

GROUP IIa.

Giant Perfection Dark Blue, H.C. Aug. 5, 1932, from Messrs. Morris of Birmingham.—Denser than fig. 61.

Nuit d'Été (Rivoire, Watkins & Simpson).—Distinct from purple variety of this name, p. 216.

Elk's Pride (Waller-Franklin, Ferry-Morse, Barr, Kelway).

Perpetual Branching Violet (Macdonald).

Flowers purple.

GROUP Ib.

DWARF LARGE-FLOWERING VIOLET (Benary, Morris).—Looser and dwarfier than fig. 59.

Erfurt Ten-week Violet (Heinemann).

TEN-WEEK PURPLE (Watkins & Simpson, W. H. Simpson, Waller-Franklin).

Ten-week Pyramidal Sapphire, **H.C.** Aug. 5, 1932, from Messrs. Heinemann.

Dwarf Ten-week Purple (Ferry-Morse).

Ten-week Large-flowered Purple (Hurst).

Dwarf Bedding Dark Blue (Dobbie).

Large-flowering Ten-week Dark Blue (Dobbie).

Large-flowering Ten-week Violet (Dobbie).

GROUP IIa.

Summer Night, H.C. Aug. 5, 1932, from Messrs. Macdonald.—Dwarfer and looser than fig. 61.

SUMMER NIGHT (Waller-Franklin, Ferry-Morse).

Nuit d'Été (Barr)—see p. 215.

Dwarf Perpetual Violet (Benary).

Prince Bismarck Dark Blue (Heinemann, Macdonald).

Bismarck Improved Purple (Macdonald).

Giant Perfection Purple, H.C. Aug. 5, 1932, from Messrs. Watkins & Simpson. Less branched than fig. 61.

Nice Purple (Ferry-Morse).

GROUP IIb.

GIANT PERFECTION DARK BLUE (Dawkins).

Giant Imperial Dark Blue (Waller-Franklin).

Tall Large-flowered Purple (Carter).

Dresden Perpetual Purple (Heinemann).

Perpetual Purple (Ferry-Morse).

GIANT PERFECTION VIOLET (Clucas).—Duller in shade.

Imperial Purple (Ferry-Morse).

Perpetual Branching Violet (Waller-Franklin).

Queen of Violets (Daniels).

GROUP III.

GIANT PERPETUAL COLUMN DARK BLUE (Morris).

Giant Perpetual Excelsior Dark Blue (Heinemann).

Flowers brownish purple.

GROUP Ib.

TEN-WEEK LARGE-FLOWERED BLACK-BROWN (Hurst).—Looser than fig. 59.

GROUP III.

GIANT PERPETUAL COLUMN BLACK-BROWN (Morris).

† Mixed packets were sent by Messrs. Watkins & Simpson, Kerr (2), Apps, Clucas, Johnson, and Carter.



FIG. 62. TYPE OF 'NICE' OR 'BEAUTY' STOCK.
(Group IIb.)

[To face p. 219.]



FIG. C. TYPE OF COLUMN SPECIES
(Group III.)

[To face p. 217.

SWEET PEAS AT WISLEY, 1932.

A TRIAL of new varieties of Sweet Peas was carried out at Wisley in 1932, under the arrangements made with the National Sweet Pea Society, whereby a Joint Committee (comprised of members of the Royal Horticultural Society and members of the National Sweet Pea Society) has been set up to deal with Sweet Peas, Mr. G. W. Leak being Chairman.

One hundred and twelve new seedlings were received for trial, and these were grown beside ninety-four standard varieties for comparison.

The seed of all varieties was sown on October 27, 1931, and the plants were put out on March 29, 1932, in rows. Twelve plants of each variety were grown naturally and twelve on the cordon system, six inches being allowed between the plants. The plants were not allowed to flower until June, and those varieties that required shading were protected from direct sun by scrim shading.

The Joint Committee judged the trial on July 13 and 14, 1932, and in addition to making recommendations for awards, selected twenty-four varieties to recommend for general garden decoration.

VARIETIES RECOMMENDED FOR GENERAL GARDEN DECORATION.

ADMIRAL, violet-blue.
 AMETHYST, blue.
 ASCOT, pale pink.
 AVALANCHE, white.
 BEATALL, pale blush cerise.
 BEAUTY, pale pink.
 BLACK DIAMOND, deep maroon.
 CHARMING, cerise.
 CORONA, rose.
 FLAMINGO, scarlet-cerise.
 HUNTSMAN, scarlet.
 INTERNATIONAL, rosy mauve.
 IVORY PICTURE, ivory.
 JESSIE, cream-pink.

LUSTRE, carmine.
 MAGNET, salmon-cream pink.
 MRS. HORACE WRIGHT, flushed,
 white ground.
 OLYMPIA, purple.
 PINKIE, deep pink.
 PORCELAIN, pale lavender.
 POWERSCOURT, lilac-lavender.
 SUNKIST, picotee edged, cream
 ground.
 SYBIL HENSHAW, crimson.
 YOUTH, picotee edged, white
 ground.

AWARDS TO NEW VARIETIES.

Flowers pink on cream.

Anglo, A.M. July 13, 1932, from Messrs. W. Atlee Burpee, of Philadelphia, U.S.A., the raisers. Pale cream-pink margined deeper; flowers large, in fours on 9- to 15-inch stalks.

Atlantle, A.M. July 13, 1932. Raised and sent by Messrs. W. Atlee Burpee. Pale salmon-pink on cream; flowers large, in fours on 9- to 15-inch stalks.

Flowers salmon-pink.

Pacific, A.M. July 13, 1932. Raised and sent by Messrs. W. Atlee Burpee. Soft pale salmon-pink; flowers large, in fours on 9- to 15-inch stalks.

Flowers cerise.

Sunrise, A.M. July 13, 1932. Raised and sent by Messrs. Carters Tested Seeds, Raynes Park, S.W. Bright cerise; flowers in fours on 9- to 18-inch stalks. This variety received the Gold Medal of the National Sweet Pea Society for 1932.

Flowers crimson.

Red Boy, A.M. July 13, 1932, from the Ferry-Morse Seed Co., San Francisco, California, U.S.A. Bright crimson; flowers large, in fours on 9- to 16-inch stalks.

Flowers lavender.

Gladys Improved, A.M. July 13, 1932. Raised and sent by Messrs. E. W. King, of Coggeshall. Lavender; flowers large, in fours or fives on 9- to 14-inch stalks.

BOOK REVIEWS.

"Seeding and Planting in the Practice of Forestry." By J. W. Trumey. Ed. 2. Revised by C. F. Korstian. 8vo. xviii + 507 pp. (Wiley, and Chapman & Hall, London, 1931.) 30s. net.

The first edition of this book was published in 1916, and the reviser tells us that it largely fulfilled the purpose which the author had in mind, which was to produce "a manual for the guidance of Forestry Students, Foresters, Nurserymen, Forest Owners and Farmers."

This sub-title expresses very well the purpose of the book, provided one remembers the limitations expressed in the title.

The matters dealt with in detail, and illustrated by a large number of photographs and drawings, include a discussion of the objects of silviculture and the methods of reproducing forests, the choice of species for artificial regeneration, the principles of spacing, and those that govern the composition of the eventual stand. A discussion is given of the comparative advantages of natural *versus* artificial regeneration, and the making of planting surveys and plans is described. Then questions of collection, extraction and storage of seeds of forest trees are dealt with and the quality of seed discussed, with methods of testing germination, the protection of seed-beds and planting sites and their preparation, the establishment of forests by direct seeding, the making of the forest nursery and transplanting of seedlings. Then follow chapters on the diseases of nursery stock and a discussion of methods, seasons and technique of forest planting.

It will be seen that the scheme of the book is very comprehensive and thorough.

"The South African Garden Manual." 8vo. 390 pp. (Speciality Press of South Africa, Ltd., Cape Town, 1931.)

This book, which has hitherto been known as "The South African Garden Annual," has passed through four editions as such and has thus proved its worth as "a Compendium of Garden Practice under South African Conditions."

Gardening is making great progress in South Africa as those who attempt it discover the plants and methods that best suit their climate, and not a little of its progress is due to the publications of the Press whence this useful book issues.

Many plants that need the shelter of a greenhouse here are, of course, perfectly hardy there, and many plants perfectly suited to our moister conditions are, naturally, there grown with great difficulty if at all. These considerations have consequently made many modifications in the book compared with one likely to suit our conditions, but it is one we can heartily commend to the people for whom it was specially written.

"The Amateur's Greenhouse." By A. J. Macself. xii + 275 pp. (Collingridge, London, [1932].) 7s. 6d.

The structure, maintenance and furnishing of greenhouses are all dealt with in this book, which contains an alphabetical list of plants suitable for greenhouse cultivation, with notes on their treatment. Warnings concerning common errors are to be found, while special chapters are devoted to food plants for cultivation under glass, to Cacti and other succulents, and to a calendar of greenhouse work. A necessary warning is given concerning the use of unsuitable heating apparatus, which is apt to result in more harm than an occasional frost will work.

"Jardins d'Aujourd'hui." 4to. 247 pp. Many plates. (Vie à la Compagne, Paris, 1932.)

This fine volume is produced by the Comité de l'Art des Jardins de la Société Nationale d'Horticulture de France, and is dedicated to the Royal Horticultural Society of England.

It is a portrayal of French gardens from early times to the present day, and illustrates many modern gardens in the French taste, mostly in France but including that recently laid out by M. Duchesne at Blenheim Palace.

The articles deal with the design of gardens of all types, and are written by various members of the Committee who have made a special study of the particular aspect of garden-planning dealt with. These chapters are short, and are amply illustrated by text figures, and the book concludes with over 100 large pages of black-and-white illustrations of gardens and their ornaments. The whole work is beautifully printed on good paper and in large type, and is a credit in every way to the producers, as well as a worthy record of French garden art at the present day.

"A Lawyer's Garden and Other Writings." By C. Barnby Smith. 8vo. 192 pp. (Besant, London, 1932.) 3s. 6d.

This is a short collection of essays on many things, and takes its title from the opening chapter, where the author deals with the planting of his garden and with the various birds and fish that subsequently found a home there.

"Wild Flowers in Sunny Fields." By Phyllis Kelway. 8vo. 95 pp. (Harrap, London, 1932.) 1s. 6d.

A book for children on the common flowers of the country and the wild creatures that live among and upon them, telling of what may be seen and letting the animals talk about it—a book most children of six or seven would enjoy.

"The Book of the Delphinium." By J. F. Leeming. 8vo. ix + 76 pp. (Pitman, London, 1932.) 3s. 6d. net.

This book can be recommended as a thoroughly practical treatise on the cultivation of the Delphinium. The author describes the composition of different soils and the methods for bringing them into condition for the reception of the plants. The structure, analysis, and manurial requirements of the Delphinium are effectively dealt with. The various types in cultivation are described, but sufficient emphasis does not seem to be placed on the value for garden decoration of the *Belladonna* types, which have mostly shades of the true blue many people favour and are generally of a vigorous hardy constitution. The instructions for hybridizing, the raising of plants from seed, the propagation from cuttings, etc., growing for exhibition, the destruction of insect and fungus pests are so fully detailed and practical that it is almost impossible for the veriest amateur to go astray. The experienced grower will also find much that is helpful.

The author advocates the use of Ridgway's colour chart for the description of colours. The names Ridgway uses for colours would in most cases never be recognized by the public. The "*Répertoire de Couleurs*," published in 1905 and now out of print, is a much better colour chart than Ridgway's.

Reference is made to the success in hybridizing of an American named Burbeck, presumably a misprint for Burbank.

"Bees, Wasps, Ants and Allied Insects of the British Isles." By Edward Step. xxv + 238 pp. 111 plates. (F. Warne & Co., London, 1932.) 10s. 6d. net.

This volume is the latest addition to that excellent library of popular handbooks known as the "Wayside and Woodland Series." All who are familiar with the other volumes in this series of which Mr. Step was author will deeply regret his death before the publication of this volume. His knowledge of and familiarity with the fauna and flora of our countryside was vast and complete, and his fluent pen has been the means of arresting the attention of and assisting young people whose bent is natural science, and who require only guidance.

This volume, endeavouring as it does to cover so wide and diverse a field as is presented by the Order *Hymenoptera*, will be acceptable not only to the amateur entomologist but to the field naturalist, both of whom may gain a general idea of the structure, habits and food of some of the commoner species representative of one of the most interesting and highly evolved groups of insects.

The form may be said to be somewhat uneven, this being due to the method of compilation into three styles; for instance there are (I) complete examples—humblebees and wasps (52 pp.); (II) partly complete examples—solitary bees and wasps, and ants (121 pp.); and (III) sketchy examples—sawflies, ichneumon and other parasitic "flies" and gall-wasps (46 pp.). It has been necessary, therefore, to disregard the natural sequence of the groups, but this defect has been remedied somewhat by adding a Classified Index of Families and Genera (pp. 223–224).

A particularly welcome feature is the section entitled "Wing-Maps of Hymenoptera," in which appears sixty-six diagrams of the fore-wings of various species of bees, wasps, and ants described in the text.

The plates number 111, of which 44 are in colour showing 470 figures, while 67 are photographic reproductions showing 170 figures. The highest praise is due both to the author for his discriminatory powers in selecting the many unique photographs and in obtaining so many beautiful plates, and to the printers for so faithfully reproducing the coloured plates.

This volume retains the high standard expected of the "Wayside and Woodland Series," and provides a worthy companion to the other volumes in this excellent series of nature books. This is a book that will be desired by all who take a lively interest in our insect fauna.

"Aspects of Evolution." By F. W. H. Migeod. 8vo. 114 pp. (Heath Cranton, Ltd., London, 1932.) 5s. net.

This work is not a textbook, but consists of a number of notes bearing on various branches of evolution. It is divided into six chapters, under which the various aspects of the subject touched upon are grouped. The chief of these are: variation, selection, domestication, environment, struggle for existence, and the species concept. The notes are of the nature of jottings, and are somewhat disjointed, but a chapter which precedes the introduction helps to give them cohesion. There are but few original observations in the book.

"Flowerless Plants: Part II of 'An Introduction to Structural Botany.'" By D. H. Scott. 8vo. 332 pp. (A. & C. Black, Ltd., London, 1932.) 7s. 6d.

The Tenth Edition of this classical work—the standby of the elementary botany class in the Universities of this country—has just been issued. It has been edited by Mr. F. T. Brooks, of Cambridge, who assisted in the revision of the last edition. It has been thoroughly revised and brought up to date in the light of recent research, especially in regard to the Algae and Fungi. Four additional "types" are introduced: *Peronospora parasitica*, *Saccharomyces*, *Euglena viridis* and *Cladothrix dichotoma*. Special care has been taken to retain the lucid style which has been a marked feature of the original volume.

"Adventures in a Suburban Garden." By Louise Beebe Wilder. 8vo. xv + 250 pp. (The Macmillan Co., New York, 1931.) 18s. net.

American gardening ladies write so many books that it is a matter of wonder that they write them so well. When we have read, or skipped, the inevitable chapter or two dealing with harmonies worked out in Tulips and other spring flowers, or Phloxes and Gladioli later in the season, there is generally much to interest British gardeners, especially when native plants are alluded to.

This book is especially pleasing because so many kinds of plants are dealt with. The writer knows and likes the plants she has grown, and also has read widely of others as yet unknown to her. Her descriptions of both classes make them appear so desirable that it cannot be long before most of them are being tested in American gardens. This should do much to raise those gardens to a higher level than that of Tulip harmonies.

"Respiration in Plants." By W. Stiles and W. Leach. 8vo. 124 pp. (Methuen, London, 1932.) 3s. 6d. net.

The authors' aim is to give a short account of the principles of plant respiration which is both readable and understandable by elementary students of Botany, and yet of value to more advanced students, and to general readers interested in the recent developments of botanical science.

They have deliberately and successfully avoided the production of an ill-assorted mass of data; on the other hand, within the limits imposed by approximately 100 pages, they deal with the salient aspects of normal respiration and respiration under conditions in which the supply of oxygen is limited.

The modern commercial fruit-grower is already concerned with the various practices and problems of storage, and will appreciate those pages which deal with the drift of respiratory activity towards senescence and decay of apples. Reference is made to the storage of apples in nitrogen and other gases, and the rate at which respiration takes place under limited oxygen pressure.

The general reader to whom this series of monographs should appeal may, however, be unable to follow most of the argument in the chapter dealing with

the mechanism of respiration, for to do so requires a fair knowledge of organic chemistry.

A valuable feature is the literature list, which covers approximately 100 references.

The quality of this work is worthy of a larger volume, including in its pages further reports of the gaseous method of storage of fruit and vegetables; the small size of the book is perhaps apt to convey the incorrect idea that the essay is a mere trifle.

"Botany for Schools." By E. R. Spratt and A. V. Spratt. 8vo. 352 pp. 407 figs. (University Tutorial Press, London, 1932.) 4s. 6d. net.

Recently educational authorities and others, perhaps less qualified to judge, have not refrained from expressing in the press and elsewhere their free criticism of the school certificate examination, and the tendency to exploit the qualification that success in it may give. As this book is primarily designed to cover the syllabus for this examination, an opportunity is afforded to horticulturists and other botanists of judging the standard of knowledge required.

The bulk of the text deals with the external morphology and elementary physiology of the flowering plants. The descriptive writing is in a simple style, here and there a few modern touches occur—"An aeroplane propeller is shaped like two ash fruits placed with the seed ends together"; and again, describing *Drosera* (Sundew), "The tip of the tentacles sends a message to its base on the surface of the leaf to curve over and hold the insect, the message is broadcast from the base of the tentacles to all others in the neighbourhood . . ."; while such analogies may prove interesting, they are also liable to cause confusion by conjuring up inaccurate pictures of the mechanism involved. The modern physiological and biochemical aspect of the plant's activities is inadequately dealt with in comparison with the external morphology. What is the value of a classification of fruits such as that on p. 215?

The sequence of the chapters is haphazard. After an introductory study of one plant, Chapter II deals with the flower and its parts; Chapter XV is entitled "More Flower Studies"; between this and one devoted to "Composite Flowers" (XIX), methods of plant nutrition are outlined; and, again, Chapter XXVIII—"Further Flower Studies"—precedes Chapter XXX, "Inflorescences."

The short chapter dealing with the properties of soils could with advantage be expanded and linked up with that dealing with plants nutrient in the soil. Similarly it might prove advantageous if all the chapters dealing with ecology were grouped together: "Heaths and Moors" (XXIV) is separated from "Woodlands" (XXVII), and "Flora of Ponds and Streams" and "Hedges and Weeds" follow a chapter on systematic classification. Nevertheless, these ecological features are very desirable.

There are many diagrams, some already quite familiar, and photographs scattered throughout the text. A few, such as that illustrating bacteria, are not up to the high standard of the remainder which illustrate the text quite well.

The price is moderate, and the book should prove useful to some teachers and to young gardeners and others desiring an introduction to the external morphology of the flowering plants.

"Homes and Gardens of England." By H. Batsford and C. Fry. Sm. 4to. x + 62 pp. (Batsford, London, 1932.) 12s. 6d.

This is an excellent addition to the "English Life" series, and like others in that series it gives a large number of admirably selected and well-reproduced illustrations mainly of the old country houses of England. Examples have been chosen from various parts of the country, so as to illustrate the various styles of domestic architecture from the Middle Ages to the nineteenth century.

A chapter is devoted to the development of the garden, and while the main motive of the pictures is to illustrate the house, the illustration of gardens is there too, of course, since the English garden is so generally the setting of the house.

"Western American Alpines." By Ira N. Gabrielson. 8vo. xviii + 271 pp. (Macmillan, New York, 1932.) 18s.

Whether it is that Saxifrages and Primulas are not abundant in the mountains of Western America, or because those great and picturesque mountains are a long way off, there is a notion abroad that they contain few plants for the lover of alpine to bother about. If this be true of the English alpine grower, it is even more true of the American, whose knowledge of European alpine is usually much greater than of those of his own land.

When Douglas was collecting in those regions he introduced to European gardens a great number of plants, but among them comparatively few true alpinists, for most of his collecting was done in sub-alpine regions and on the plains. Strangely enough, comparatively little real exploration has been done since, save on such great mountains as Mt. Rainier and Mt. Hood, and even now only a general knowledge of the alpine flora of this part of the world is available. It is a region that would well repay a thorough search, and among the plants that are known there are a great number that are worth introducing or re-introducing.

Some of them would no doubt be difficult to establish on the open-air rock-garden, but with the development of the alpine house in such a form as the one at Wisley, it would be possible to grow numbers of them to perfection. The desert plants which approximate to alpine plants in habit would need protection from winter wet and possibly from late frosts; but no doubt the cool summer conditions and the moderate sun which we experience would suit many of these Western American plants well when once we realized that they were for the most part plants of acid but thoroughly well-drained soil, often consisting of the accumulated remains of thousands of years of forest debris.

We welcome this book, therefore, and hope that it will reach the hands of many lovers of alpine plants, for we feel sure it will earn for the region with which it deals the interest it deserves, and send many seeking for the plants enumerated and the others of which as yet we have no knowledge. They will be well repaid.

The book has three chapters.

The region covered is described in the first chapter in concise and eminently readable English. The whole book, indeed, is notable for its clear language and freedom from Americanisms as well as unnecessary technical terms, and remarkable too among American books on gardening for its freedom from quotations from books written in England. It is written by a man who loves the mountains and the plants they nurture, who has a clear idea of what he wants to say, and who says it with as little circumlocution as possible. It calls for nothing but praise.

The region described stretches from southern British Columbia to northern California, and embraces the Coast Range of Oregon which passes north of the Columbia River into the Olympics rich in alpinists. A hundred miles east lie the Cascade Mountains, among which Douglas did much of his exploration, and the floristically similar cross ranges between them, the Calapooyas and the Umpquas, and the rich Siskiyou, partly in Oregon, partly in California. Eastward again lie the mighty Rockies, and all converge into the great ranges of northern British Columbia. It is a wonderful country of diverse rocks cut deep by mighty rivers, with glaciers and moraines, great canyons and stupendous cliffs, forests and alpine meadows, rocks and screes diverse enough to provide homes for the hundreds of alpine plants described in Chapter III.

In Chapter II there are some very wise words on alpine gardening in general, and on the growing of Western American alpinists in particular, worthy to be read by the most hardened rock gardener to his profit.

Chapter III begins on p. 23 and ends on p. 261. In it are described the known plants of the region (the species being divided on a conservative basis), with notes on growing them and estimates of their garden value. The descriptions are brief and simple, and are rather word-pictures than dry details. These descriptions are supplemented by many excellent illustrations of the habitats and of the plants mentioned, reproduced from photographs.

It is altogether a notable book.

"Mechanisms—A Textbook for the Use of Non-technical Students." By E. S. Andrews. 8vo. vii + 194 pp. (University Press, Oxford, 1926.) 2s.

This clearly written little book should be of value to all who have to do with the running of a garden where gearing is used for ventilators, where lawn-mowers are used, and where other mechanical aids to the carrying out of the work are involved. Diagrams of screw mechanisms, linkage mechanisms, types of heat engines, pulleys, jacks, bearings, cams, and the rest are all illustrated and explained.

"The Garden Register." By Marion Cran. Oblong 8vo. 231 pp. (Jenkins, London.) 5s. in cloth; 8s. 6d. in leather.

This is a book for notes divided under several headings, with pages ruled to receive them. The divisions are headed by more or less appropriate quotations, in the main from Mrs. Cran's books.

"Orchids for the Outdoor Garden." By A. W. Darnell. 8vo. xx + 467 pp. (L. Reeve, Ashford, 1930.) 42s. net.

Would that we could hope to grow half of the plants described in this "Descriptive List of the World's Orchids that may be grown outdoors in the British Isles." This book "for the use of the Amateur Gardener" gives names, descriptions, and habitats of 977 species of the Orchid family, which the author has culled from the botanical literature of the world, choosing those which are found growing wild in places which he believes would justify giving them an opportunity to make themselves at home outdoors in the British Isles.

When one reads, as one does very often, of a species, "It may be grown outdoors in" so and so—it is not to be assumed for a moment that anyone has tried to grow it there, still less that he has succeeded. Occasionally one finds it said of a species, "It is hardy," but even that does not mean it is easy to grow.

The book is thus to be regarded as indicating the enormous number of species which occur in terrestrial situations within the limits of temperature found within the British Isles, and the cultural notes merely suggestions of what may possibly suit the plant when by dint of much effort it is transferred to these shores. When one remembers how difficult even our British species are to establish, one cannot help but feel the author is unduly optimistic in applying to so many of them the word "may" in his cultural notes. Furthermore, when he says a species may be propagated by "imported seeds," he is again, we fear, unduly optimistic, for many Orchid seeds have a very brief span of life and demand very special conditions for their cultivation.

Our thanks are due to the author for bringing together such a vast amount of information, quite apart from his essays into cultural requirements, gleaned in many instances from books not readily accessible, and for the twenty-two illustrations he has prepared, the first being coloured.

"The Shakespeare Garden." By Esther Singleton. 8vo. xxv + 366 pp. (C. Palmer, London, [1932].) 12s. 6d. net.

This is a reprint of a book which was published in America in 1922 with the addition of an "Introduction" by Eva Turner Clark, in which the identity of the "Shakespeare" with Edward de Vere, seventeenth Earl of Oxford, is averred, and his first knowledge of flowers traced to the garden at Castle Hedingham; and of a Bibliography of six pages.

The problem of the identity of Shakespeare, intriguing as it is, need not interfere with the enjoyment of this book, and the abundant information it gives upon the old-fashioned flowers of our English gardens which were known and loved when Perdita first spoke of

"The marigold that goes to bed with the sun
And with him rises, weeping."

Those who do not possess the book from its first printing will be glad to know it is available again.

"The Rock Garden." By Reginald Farrer. Sq. 8vo. xi + 128 pp. (Nelson & Jack, [1932].) 3s. 6d.

This is a reprint of one of the most useful books on rock-gardens that have appeared, differing from the first printing only by a slight change in the title-page. It contains the excellent coloured plates which embellished the book when it first appeared, as well as the concentrated essence of Reginald Farrer's knowledge of and love for the plants of the high hills.

"The Garden Handbook." By M. R. Jay. 8vo. xv + 280 pp. (Harper, New York, 1931.) \$3.50.

The idea of this book is to point out (very briefly, of course) the characteristics of the gardens of many parts of the world, and to show how they may be adapted to American conditions. Illustrations help the treatment, and the gardens and plantings illustrated are scattered almost all over the world.

It is all rather breathless, but it gives an idea of what has been accomplished, and will awaken suggestions as to what may be done.

The first appendix (pp. 259–266) gives a list of plants for Florida gardens; the second (pp. 267–279) a "tabulation of flower suggestions arranged alphabetically, giving color, month and height," and flowers for shady places.

Throughout there are lists of gardens worth visiting and of gardening books to be consulted.

"Cactus Culture." By Ellen D. Schulz. 8vo. xi + 157 pp. (Orange Judd Publishing Co., New York, 1932.) \$2.00.

This book is an introduction to the cultivation of Cacti; it begins by defining the characteristics by which Cacti may be distinguished from other succulent plants and suggests that the best way to start a collection is by the acquisition of one plant, whose name and distinguishing features should be thoroughly learned, rather than by beginning with a large number of plants, which are never fully understood. Several chapters deal with the formation of Cactus and Desert Gardens; the advice given is practical, but will not have much appeal for English readers, since the growing of Cacti in the open in this country to any great extent is not a practical proposition. The chapter on "Nurslings" gives useful advice on seed-raising and there are also directions for grafting.

The information is given in a simple and readable manner, and there are good photographic illustrations of plants in their native home and under cultivation. The decorative tailpieces to the chapters have been drawn by B. C. Mead. Scientific names are not much used, but the authoress evidently still adheres to the American code.

"The Cactus and its Home." By F. Shreve. 8vo. ix + 195 pp. (Williams & Wilkins, Baltimore, and Baillière, Tindall & Cox, London, 1931.) 16s. net.

Both in America and in this country there has recently been a revived interest in the cultivation of Cacti, and along with it an increase in the literature of Cacti and their cultivation. The present book is a popular account of the botany of the Cactus and of its distribution and habit of life, especially in the Western States of North America. Cacti native in other districts are not, however, neglected, and there are a good many notes on species from other parts of America. The book contains five chapters entitled respectively "What the Cactus is," "How the Cactus is built," "What the Cactus is named," "The Cactus in its Home," and "How to cultivate the Cactus."

The last chapter deals mainly with Cactus-growing in the open air, and will therefore be of chief interest to dwellers in warm temperate regions with a dry climate; the others will interest Cactus-growers anywhere. The information given is accurate and clearly expressed, and the illustrations well chosen.

The "get-up" of the book is excellent, and very few of the typographical errors which reviewers often delight to seize upon are to be found.

In nomenclature Britton and Rose have been followed, not without due recognition of the drawbacks in the use of their great book, but the great contribution to popular knowledge is the chapter on the Cactus in its home, and this makes the book particularly worth perusal.

"Perfumes, Cosmetics and Soaps: with Special Reference to Synthetics." By W. A. Poucher, Ph.C. Vol. II. Ed. 4. 599 pp. (Chapman & Hall, London, 1932.) 30s. net.

The new edition of this important work does not differ very materially from former editions, except that it includes a cosmetic colour chart, two new flower monographs, and several pages on Continental practice in blending perfumes.

The work is divided into two parts: "Perfumes" and "Cosmetics." Part 1, "Perfumes," commences with 17 pages of historical data connected with perfumes, which carry the reader back several thousands of years. The production of natural perfumes is then discussed, followed by a chapter on the purchase and use of flower absolutes. Then come odour classification, fixations, monographs on flower perfumes, fancy perfumes, toilet waters, soap perfumery, tobacco flavours, floral cachous, incense and fumigants, sachets, and solid perfumes.

Part 2, "Cosmetics," deals with bath, dental, and hair preparations, hair dyes, lip salves and rouge sticks, manicure preparations, shaving preparations, smelling salts, toilet powders, skin creams and lotions, theatrical requisites, with an appendix of weights and measures, and an inset colour-chart in a pocket inside the back cover.

In a highly technical work the Monographs on Flower Perfumes are perhaps of greatest interest to horticulturists. These carry the work from page 91 to page 242, and a very considerable number of fragrant-flowered plants are passed in review. The method of dealing with the various subjects is typified by *Heliotrope*. Commencing with the history of the plant and its perfume, the author passes to the cultivated varieties, odour, chemistry, compounding notes, synthetic components, and, finally, to formulas for various popular perfumes.

The book will be found of considerable use to those people who are interested in the economic products of plants, and to all who are in any way connected with the important commercial interests of perfumery and cosmetics.

"Orchard and Small Fruit Culture." By E. C. Auchter and H. B. Knapp. Ed. 2. 8vo. xix + 584 pp. (Wiley, New York; Chapman & Hall, London, 1932.) 31s. net.

This excellent book was reviewed in our JOURNAL on the publication of the first edition in 1929.

A second edition has now been called for, and it will be found to contain revised statistics of trade in various fruits between the United States of America and other countries. The bibliographies have been revised so as to include the most recent accounts of research work available to students.

The general text, size and form of the book remain the same.

NOTES AND ABSTRACTS.

[For Index of Periodicals quoted see previous volumes.]

Acidity in Soil suspensions, Determination of the degree of. By J. Lindeman, V. Naesvold and F. Loschbrandt (*Medl. f. Norges Landbruksh.*, vol. 12, pp. 727-910, 1932; figs. and tables).—The authors have studied the applicability of the Quinhydrone method of determining soil acidity, and discuss apparatus and method. The work done in Norway is published in English, and is an important contribution to our knowledge of a difficult subject.—F. J. C.

Apple Sawfly, *Hoplocampa testudinea* Klug., On the Biology of the. By H. W. Miles (*Ann. App. Biol.*, xix. 3, Aug. 1932, pp. 420-431; 3 plates).—Observations regarding the habits of the larvæ and adults of this widespread pest have been carried on for a period of three years, and the data accumulated have been set out in detail.

The methods of mating and oviposition are described—the eggs being found usually beneath the epidermis of the floral receptacle within the calyx ring, and often within the bases of the stamens. The incubation period varies from eight to fifteen days, and the larvæ, which emerge on the outside of the fruitlet, penetrate it either from within the calyx ring, or by passing over the calyx on to the side of the receptacle and tunnelling in there. The circular or ribbon scars which are so prominent on infested fruits appear to arise as a result of the wanderings of the first-stage larvæ during their first penetration of the fruit.

The larvæ overwinter in cocoons in the soil, and are found to a depth of from 3 to 9 inches. The pupal stage lasts three to four weeks.

Table III gives an indication of the varietal susceptibility of apples as recorded at Reaseheath, Cheshire. It was found that while both early- and late-blossoming varieties may be badly attacked, the varieties flowering during the mid-blossoming period are most uniformly infested. While varietal susceptibility appears more important than date of blossoming, the factors of scent, abundance of pollen and nectar may determine the degree of attraction of particular varieties for the insects.

The critical factor in securing satisfactory control is the time of application of the spray fluid. Spraying with a nicotine-soap wash should take place before rather than after the hatching of the larvæ, and the wash should not be applied until after the petals have fallen in order to ensure that the spray fluid penetrates within the calyx cup.—G. F. W.

Apple Tree, Study of the Framework and its Relation to Longevity. By W. A. Ruth and V. W. Kelly (*Agr. Expt. Sta., Illinois, Bull.* 376; 1932; figs.).—The longevity of apple trees is considered to be dependent more upon treatment than locality, and in treatment particularly upon pruning. A central leader type of tree is preferred in Illinois, but most trees are vase-shaped, and poor heads are attributed to severe heading back of young trees. Disbudding of young trees is recommended so as to secure vertical spacing of branches. Much experimental work is reported, and an interesting review of previous work and opinions is given.—F. J. C.

Arum Lily Disease caused by *Phyllosticta Richardiae* n. sp. By F. T. Brooks (*Ann. App. Biol.*, xix. 1, Feb. 1932, pp. 16-20; 1 plate).—The appearance of a serious disease of the Arum Lily, *Richardia africana*, in the Scilly Isles during 1930 made an investigation necessary.

The symptoms of attack are that large brown blotches are formed on all parts of the aerial shoot system.

The cause of the disease was found to be a new species of *Phyllosticta*, a description of which is given.

The control measures advocated are: (i) the prevention of high humidity under glass by judicious ventilation and watering; (ii) the prompt destruction of all diseased parts of plants and Arum Lily debris; (iii) the practice of rotation so that Arums are not grown in the same ground for any lengthy period; and (iv) the destruction of all weeds in land used for Arums, as it is possible for the fungus to live saprophytically upon some weed.—G. F. W.

Blackberry Mites, The. By A. M. Massee (*Jour. Pomology*, ix. 4, Dec. 1931, pp. 298–302).—The six species of Gall Mites which have been recorded on plants of the genus *Rubus* are briefly described.

Four species occur on economic plants, viz.: (1) *Eriophyes essigi* Hassan, on wild and cultivated blackberries, loganberry, raspberry, and Himalaya blackberry; (2) *E. gibbosus* Nal., on twenty-eight different species of *Rubus* including the cultivated blackberries; (3) *E. gracilis* Nal., on blackberry, raspberry, dewberry, and Himalaya berry; and (4) *E. rubicolens* Can., on blackberry, dewberry, and raspberry.

E. essigi is the cause of "Redberry Disease" in America, and causes similar damage to cultivated blackberries in this country. The habits of this mite and its effect in the fruits are described in detail. This pest may be controlled by spraying infested canes in spring (*i.e.* during the latter part of February), when the mites are migrating, with a strong application of lime-sulphur.—G. F. W.

Eelworms. The Genus Anguillulina Gerv. and v. Ben, 1859 (*Tylenchus* Bastian, 1865). By T. Goodey (*Jour. Helminthology*, x. 2, 3, June 1932, pp. 75–80; 117 figs.).—This paper brings together brief descriptions of the various species of the genus *Anguillulina*, which is more generally known as *Tylenchus*.

The dimensions and morphology are given of the several species, arranged under the headings: I. Plant-parasitic Species attacking Shoot Structures; II. Plant-parasitic Species attacking Root Structures; and III. Free-living Species.

With regard to groups I and II, additional data are given on the life history, hosts, and geographical distribution.

An alphabetical list of *Tylenchus* species with their present status is added.

The bibliography includes references to 122 papers.—G. F. W.

Eelworms: New Hosts of Anguillulina dipsaei (Kühn, 1858) Gerv. and v. Ben, 1859, with some Notes and Observations on the Biology of the Parasite. By T. Goodey (*Journ. Helminthology*, ix. 4, Nov. 1931, pp. 191–196; 1 plate).—The occurrence of the stem eelworm in Carrots is recorded for the first time, and the chief symptoms of attack are described.

A list of eighteen additional host plants is given.

The second part of the paper deals with a matter of great interest and practical importance, *i.e.* the length of time the parasite can remain alive in moist soil in the absence of a suitable host plant. The work of Rostrup is reviewed, while the experiments carried out by the author are described in detail. The results indicate that the parasite is able to survive little longer than twelve months in a moist aerated medium and in the absence of a suitable host plant.

Further investigations on this subject are necessary, more especially as the results obtained by Rostrup do not agree with the accumulated evidence of the past sixty years.—G. F. W.

Erodium Mouretii Pitard. By W. B. Turrill (*Bot. Mag.*, t. 9268; Feb. 1932).—Native of western Morocco and closely related to *Erodium moschatum* and *E. tordylioides*, but with glandular hairs and purple blotches and lines on the petals. Perennial, and about 12 to 18 inches high.—F. J. C.

Erythroneura (Zygina) pallidifrons Edwards, **The Biology of.** By E. I. MacGill (*Bull. Entom. Res.* xxiii. Pt. I, March 1932, pp. 33–43; 6 figs.).—This species of Jassid or leaf-hopper has become within recent years a serious and widespread pest of many glasshouse plants.

The egg, nymphal and adult stages are described and figured.

Both nymphs and adults feed on the leaves, generally on the lower surface, but the stylets are frequently pushed through to the palisade tissue so that the damage done is first apparent on the upper surface of the leaf. An early infestation is noted by the presence of numerous round white spots where the chlorophyll has been removed. Later, the spots become confluent and irregular white

patches are formed. The leaves are also soiled by the fluid excreted by the nymphs and a suitable matrix for moulds is thus formed.

The chief host plants are *Chrysanthemum*, *Gossypium*, *Fuchsia*, *Geranium*, *Nicotiana*, *Primula*, *Salvia* and tomato.—G. F. W.

***Euphorbia sudanica* sp. nov.** By A. Chevalier (*Bull. Mus. d'Hist. Natur.*, 4, p. 589; June 1932; figs.).—A fleshy species from 3 to 6 feet in height, with numerous spiny branches, glaucous green or reddish when young. Flowers greenish-yellow, flowering (in its home) in March. Poisonous according to the natives and very common on rocks and elsewhere in the valley of the middle Niger.—F. J. C.

***Fremontia mexicana* Macbride.** By O. Stapf (*Bot. Mag.*, t. 9269; Feb. 1932).—This is regarded as distinct from the well-known *Fremontia californica* by its larger flowers and leaves, the latter with more evident coarser hairs. The calyx glands are more or less beset with longish hairs, the capsules larger and bluntly ovoid, and the seeds larger. The flowers are of the usual *Fremontia* yellow.—F. J. C.

Fruit- and Berry-growing (*Bull. Appl. Bot., Leningrad, Ser. 8, 1; 411 pp.*; 1932).—An illustrated account of the various hardy fruits of Russia mostly in Russian, but with summaries and notes in English. The illustrations of varieties, though poorly reproduced, are valuable.—F. J. C.

Fruit Pests by Winter Spraying, The Control of. By H. W. Miles (*R. Lancs. Agric. Soc. Ann. Jour.*, 1932, 16 pp.; 3 figs.).—The results of investigations to determine the degree of control of the major pests of fruit trees, principally apple, following the application of dormant sprays, are given.

The work was carried out in Lancashire and Cheshire, and the soil and climate together with the types of plantation existing in these counties are considered.

The chief pests concerned were four species of *Aphis*, the apple sucker, the winter and mottled umber moths, various *Tortrix* moths, the fruit tree red spider, and the common green capsid bug.

The results of comparative trials carried out with fourteen proprietary washes are tabulated.

The effect of tar-distillates and petroleum oil emulsions on the several pests are reviewed, together with remarks on the effect on the yield and quality of the fruit.

The general conclusions reached were that (i) tar oils, though showing some variation from year to year, effect a satisfactory control of aphides and apple sucker, and a considerable reduction in caterpillar attack, when used at 7-8 per cent.; (ii) petroleum oil emulsions give a very satisfactory control of red spider, but fail to control aphides and apple sucker to any extent and are less effective in reducing caterpillar attacks; and (iii) the use of a combination wash of tar oils and petroleum oils gives efficient control of all the major pests of apples.

G. F. W.

Fungicidal Dusts and Sprays, Laboratory Examination of. By H. Martin (*Ann. App. Biol.*, xix. 2, May 1932, pp. 263-271).—The usefulness of laboratory tests in serving to sift out new fungicides or to analyse problems of fungicidal action is stressed. The variable results obtained in the field make such trials useless for establishing differences in fungicidal efficiency. Improvement in the method of conducting field trials is necessary, though elaboration can only be rescued from empiricism by the use of such pointers as are supplied by laboratory tests.

The definitions of direct and protective fungicides are made clear, while other factors considered are the toxicity of the active fungicide, the formation of the toxic agent, atmospheric agencies, the intervention of the fungus and of the host plant, and the adherence of the fungicide.—G. F. W.

Insecticidal Properties of *Tephrosia macropoda* Harv., and other Tropical Plants, The. By F. Tattersfield and C. T. Gimingham (*Ann. App. Biol.*, xix. 2, May 1932, pp. 253-262).—The toxicity to insects of a considerable number of tropical plants has been examined during recent years, and the data recorded are sufficient to indicate that there is a wide field likely to produce results of great economic importance. All the plants so far examined which possess both insecticidal and fish-stupefying properties belong to the natural order Leguminosae.

A list is given of thirty-nine species of plants which have been tested but

which appear to possess little or no toxicity to the bean aphid, *Aphis rumicis*, when tested under standardized laboratory conditions.

The insecticidal properties of three tropical fish-poisons, viz. *Mundelea suberosa* Benth. (India), *Neurautanenia (Rhynchosia) ficifolia* C. A. Sm. (Southern Rhodesia), and *Tephrosia macropoda* Harv. (Natal), were studied and the results indicate definite activity as contact insecticides.—G. F. W.

Insecticides, Laboratory Methods for Evaluating. By F. Tattersfield (*Ann. App. Biol.*, xix. 2, May 1932, pp. 281-290).—Laboratory tests of insecticides will not necessarily provide full and complete information of the economic value of any particular chemical compound or plant product, but they do form a valuable adjunct to field trials, thereby saving time, labour, and money in selecting the more potent materials for large scale trials.

The methods and forms of apparatus used for testing both stomach poisons and contact insecticides are described.

Some of the problems which have yet to be solved before our knowledge of the chemistry and physics of spray fluids becomes complete are: the specific resistance shown by some insects to the effects of certain classes of insecticides; the seasonal variation in the resistant powers of insects; and the mode of action of insecticides in general.—G. F. W.

Lilium Brownii var. *colchesteri*. By G. A. C. Henklots (*Hong-Kong Naturalist*, 8, pp. 82-89; May 1932; figs.).—An account of this Lily, which occurs wild in Hong-Kong and is, now that it is protected, more than holding its own. This appears to be the only Lily wild in Hong-Kong, and it varies from the typical bronze-purple coloration to almost white, and the pollen from deep orange to pale yellow. The author thinks the latter form may have been mistaken for *L. longiflorum*, which is recorded from Hong-Kong. This Lily is cultivated in Kiangsu and Southern Manchuria for its edible bulbs, which are boiled in water, the water being also used for medicinal purposes. In Hong-Kong, growing on hillsides, the height varies from 2 to 5 feet, and the number of flowers from one to four.—F. J. C.

Mexico, Guatemala and Columbia, The Cultivated Plants of. By S. M. Bukasov (*Bull. Appl. Bot., Leningrad, Suppl.* 47; 553 pp.; plates and figs.; 1930).—The results of a Russian expedition in 1925-1926 to the countries named are detailed in Russian with an English summary, and English legends to the illustrations. Special chapters deal with cereals, beans (*Phaseolus vulgaris*, *P. multiflorus*, *P. lunatus*, and *P. acutifolius*), cotton, potato (*Solanum* sp., of which several new forms are described), other tuber-producing crops (*Tropaeolum tuberosum*, *Ullucus tuberosus*, and *Oxalis tuberosa*), various root crops, peppers, and a number of native fruits.—F. J. C.

Narcissi, Early Forcing of [Vroegebroel van Narcissen]. By J. J. Beijer and E. van Slogteren (*Lab. v. Bloembollenonderzoek te Lisse, Bull.* 45, Aug. 1932; figs.).—An account (in Dutch) of experiments in early forcing of Narcissi and the preparation for it. Bulbs of 'Glory of Sassenheim' were kept for two weeks from July 16 in the warehouse at 62° F. and then at 48° F. until September 21 when they were planted in boxes; others were kept at 48° F. until planted up. The latter gave quicker results if kept until bringing into the house at 48° F. and were had in flower as early as December 8. Similar results were obtained with other varieties. 'Victoria,' 'Talma,' 'Lucifer,' 'Golden Spur,' 'Early Sunrise,' 'Lady Moore,' and 'Yellow Poppy' all responded to the storage temperature of 48° F. better than to higher temperatures for part or the whole of the time.—F. J. C.

Orange, A Monograph of the Satsuma, with Special Reference to the Occurrence of New Varieties through Bud Variation. By Prof. T. Tanaka (*Memoirs, Univ. of Taihoku*, vol. 4, 1932; 626 pp.; plates).—The author gives an account of the Satsuma oranges and their botanical and pomological characteristics, and devotes a great deal of attention to the variations which occur in the plants, and especially to the origin of new varieties by bud variation. This is an important contribution to our knowledge of the origin of varieties by somatic segregation in oranges, and gives scientific support to the idea that bud selection may lead to the improvement of strains of these fruits.—F. J. C.

Paeonia albiflora, Results in Breeding and its Botanical and Horticultural History. By Bungo Miyazawa (*Bull. Kanagawa-ken Agr. Exp. Sta.* 59, 1932; 230 pp.; col. pl.).—Various forms of *Paeonia albiflora* have been cultivated for

about 500 years in Japan, but the plant originated in Corea, China, or Siberia. European taste has encouraged here the double forms, but in Japan hitherto single varieties have been more favoured. In order to secure varieties suitable for foreign countries breeding experiments were commenced in 1910, using the Japanese varieties and about fifty European varieties as a basis. Many hundreds of seedlings were raised, and about 700 have been selected and named. The bulletin (in Japanese) describes the methods of breeding and the new varieties obtained, including a new race with flowers flatter than those of the "Rose" and "Semi-rose" types commonly cultivated in Europe. This race is called the "Flat-rose" type, and is characterized by the absence of side carpels and stamens. There are many illustrations, a large number of them in colour, and the latter are excellent. A very useful bibliography of the Pæony is included.—F. J. C.

Pear Leaf Blister Mite as a Cause of Fruit-bud Injury, The. By A. D. Borden (*Agr. Exp. Stat., California Circ.* 324, April 1932, 8 pp.; 3 figs.).—The pear orchards in California have for a number of years suffered considerable damage from dead fruit buds in winter, weak flowers at blossoming time, and russeted, misshapen fruit at harvest. Owing to the absence of blisters on the foliage, the identity of the responsible agent was in doubt, but further work showed that it was *Eriophyes pyri* Pagen.

The origin and distribution of the mite are discussed.

The host plants include apple, pear, service berry, Cotoneaster, white beam tree, European mountain ash, and the wild service tree. Six varieties of pear and three varieties of apple are so far found to be infested in California.

The symptoms of attack are described in detail, while comparisons are made between the life histories of the bud and blister forms of the mite.

Control measures include: (i) Spraying the trees in early autumn with lime-sulphur (7½–10 per cent.) to destroy the mites before they enter the buds; and (ii) pruning out the new growth terminals and sucker growths inside the tree.

G. F. W.

Phlomis italica Linn. By O. Stapf (*Bot. Mag.*, t. 9270; Feb. 1932).—Native not of Italy, but of the Balearic Islands, a dwarf hairy shrub, with foliage dark green above and white beneath, with spikes of purple and pink flowers, hairy both within and without. Not frequent in gardens, but hardy, and worth a place.—F. J. C.

Potato Sickness, The Problem of. By A. S. Buckhurst and J. C. F. Fryer (*Ann. App. Biol.*, xviii. 4, Nov. 1931, pp. 584–601; 2 plates).—A study of the cause of "potato sickness" over a period of two years in the field and in the laboratory has shown: (i) That there are no grounds for suspecting the fungus *Corticium Solani* as a primary cause of the disease; (ii) that typical "sickness" does not occur in the absence of the eelworm, *Heterodera schachtii*; (iii) that the disease does not necessarily occur even when the eelworm is present on the roots in quantity; and (iv) that there is no correlation between the cyst content of the soil and the degree of intensity of the "sickness."

Detailed descriptions are given as to the various dressings applied to the field plots and to the plants grown in pots.

The available evidence suggests that the diseased condition is due to an attack by the eelworm in conjunction with a soil factor that inhibits vigorous early growth of roots.—G. F. W.

Primrose (*Primula acaulis*), Genetics of the. By B. H. Buxton (*Jour. Gen.* 25, pp. 195–205; Feb. 1932; plate).—An account is given of breeding experiments with various colour-forms of the common Primrose, for which a pure white form found at Wisley has been the basis. A long series of colours and shades has been secured, but it has not been possible to obtain a blue flower on a pure white ground, the nearest approach being a dull purple. In the succeeding paper Miss Scott-Moncrieff gives some account of the flower pigments in these Primroses.—F. J. C.

Primula Root Aphid. By F. Stoker (*Flora and Silva*, April 1932, iv. 3, pp. 208–216).—This root pest, once described as *Trama auriculae* but now known as *Pentaphis auriculae*, is a generally distributed pest on many species of *Primula*.

A short, non-technical description is given of the apterous, viviparous female, while the life history is briefly described.

The host plants include all cultivated species of *Primula*, more especially the species and hybrids of the European group when grown in pots.

Methods of spread, the symptoms of attack, and the characters which distinguish a root mealy bug from a root aphid are points which receive attention.

Control methods are grouped under the headings: Prophylactic Treatment and Active Treatment.

Preventive measures include: (i) The use of old loam; (ii) the employment of peat in preference to leaf mould; (iii) the planting of Primulas in the open ground only after the grass roots have disappeared; (iv) the avoidance of its spread by observing cleanliness in pots, crocks, tools, plunging material, frames, and alpine houses; (v) the frequent examination of pot plants and their isolation when found to be infested; and (vi) the examination of all newly purchased plants.

Remedial measures include: (i) The drying out of infested pots to the ultimate degree commensurate with safety to the plants; and (ii) the immersion and complete saturation of the pots and soil in a nicotine-paraffin solution, followed by partial shading to prevent any scorching of the foliage.—G. F. W.

Primulaceae Studies of flowering in Heterostyled and Allied Species. By J. Stirling (*Pub. Hartley Lab., Liverpool*, 8; 1932; 42 pp.; figs.).—The origin of heterostylism is discussed, and as a result of measurements made upon the developing flower it is concluded that the short-styled forms are derived from ancestral types with long styles. The general conclusions are found to hold in *Hottonia palustris* as well as in several species of *Primula*.—F. J. C.

Pyrethrum. By S. G. Jary (*Jour. S.E. Agric. Coll., Wye*, 30, July 1932, pp. 183-185; 1 fig.).—This paper summarizes the work carried out on a half-acre plot at Wye College over a period of two years, special reference being made to the cultivation, harvesting and yield, and pyrethrin content of the crop.

While it appears that Pyrethrum can successfully be grown in this country, the problems in connexion with its harvesting and drying still remain unsolved and require to be improved and cheapened.—G. F. W.

Pyrethrum Flowers: A Quantitative Study of their Development. By F. Tattersfield (*Ann. App. Biol.*, xviii. 4, Nov. 1931, pp. 602-635; 1 plate).—The purpose of the investigation was to follow the development of the flowers of Pyrethrum (*Chrysanthemum cinerariaefolium*), and to ascertain the way in which the pyrethrin content varies with the degree of development of the flowers, and between plant and plant grown from the same seed and in the same soil at Harpenden. Considerable variation occurred in the yield in both numbers and weights of heads per plant, in the diameters of the receptacles, and in the content of Pyrethrin I and II.

Analyses of the several factors are given in detail.

A loss, which might be serious, appeared both in percentage content of active principles and in flower yield if harvested before the blossoms are fully open. No useful purpose is served by leaving the flowers until they are in the over-blown condition.—G. F. W.

Raffenaldia primuloides Godron. By O. Stapf (*Bot. Mag.*, t. 9267; Feb. 1932).—A discussion is given on the validity of the name *Cossonia primuloides*, and the present name *Raffenaldia* which is shown to pre-date *Cossonia* is adopted. The plant is a dwarf Crucifer with yellow flowers and dandelion-like leaves in a rosette, from Algeria and Morocco, perennial there and easily raised from seed. Hardy at Kew and Geneva.—F. J. C.

Raspberry Beetle, Further Observations on the Habits of the: with Special Reference to the Control of the Pest by Means of Derris. By W. Steer (*Jour. Pomology*, 1932, x. 1, pp. 1-17).—The life history and habits of the raspberry and loganberry beetle, *Byturus tomentosus* Fabr., have been studied with a view to finding a stage at which the pest might be most effectively and economically destroyed.

Some new observations are given as to the presence of the eggs on the stems and petioles, and the presence of larvæ in the tips of the young canes.

Detailed descriptions are given on the methods of applying the various spray fluids and dusts and the results obtained in field trials at the East Malling Research Station.

Promising results followed the use of a proprietary Derris preparation applied ten days after the first eggs were observed, and again a week to twelve days later. The average infestation of loganberries was reduced from 66.3 to 14.6 per cent., and of raspberries from 78.3 to 5.6 per cent. General results indicate the possibility of achieving satisfactory control with one or two applications

of nicotine-soap wash (nicotine, 8 oz. ; soft soap, 10 lb. ; water, 100 gallons), or with a single late Derris spraying.

The economics of spraying both crops with either Derris or nicotine are discussed in detail.—G. F. W.

"Red Spider" Mite, *Tetranychus telarius* L., The Toxicity of the Vapours of Volatile Organic Compounds to the. By W. H. Read (*Ann. App. Biol.*, xix, 3, Aug. 1932, pp. 432-438).—Investigations were made with a view to ascertaining the relation between the chemical constitution and the toxicity of the vapours of compounds towards this mite.

The methods employed are described.

The effects of the vapours of the aliphatic alcohols and their formic esters on Red Spider and on tomato plants are given.

Control of the mite was not obtained on tomato plants without injury by the use of any of the substances tested.—G. F. W.

Root-Gall Nematode, *Anguillulina radiculola* (Greef, 1872), Some Observations on the Biology of the. By T. Goodey (*Jour. Helminthology*, x, 1, Feb. 1932, pp. 33-44 ; 2 figs.).—The absence of detailed information regarding the infective stage of the root-gall nematode and its life history has been remedied by the author. Previous work with this parasite has shown that infective material derived from *Elymus arenarius* could give rise to galls on the roots of barley and *Poa annua*, and that the barley strain could produce galls on *E. arenarius*.

The experiments, which are described in detail, made it possible to follow the course of the parasite's life history. The infective stage is the first-stage larva, which invades the roots and gives rise to galls in which it grows. The parasite is able to endure desiccation without being killed only as first-stage larvæ.

The anatomical structure of normal and galled roots is described and figured.

A list is given of twelve host plants which have been found harbouring the parasite under natural conditions, and those in which galls have been produced under experimental conditions.—G. F. W.

Root-Gall Nematodes, On the Nomenclature of the. By T. Goodey (*Jour. Helminthology*, x, 1, Feb. 1932, pp. 21-28).—A perusal of the early literature on the nematodes which produce galls on the roots of plants has shown that it is necessary to make certain alterations in the names of the organisms. The data on which the alterations are based are presented and discussed in the light of the International Rules of Zoological Nomenclature.

A list of eighteen species of the genus *Anguillulina* is given, including *A. (Tylenchus) dipsaci* (Kühn, 1858) Gerv. and v. Ben. 1859, the well-known stem eelworm, while the three species of the genus *Heterodera* include the root-knot eelworm which, previously known as *H. radiculicola* (Greef, 1872) Müller, 1884, now becomes *H. marioni* (Cornu, 1879).—G. F. W.

Sawflies infesting Ribes, Biological Studies of. By H. W. Miles (*Bull. Entom. Res.* xxiii, Pt. I, March 1932, 16 pp. ; 5 plates).—The three *Ribes*-infesting species under consideration are: the common gooseberry sawfly, *Pteronidea ribesii* Scop., *P. leucotrochus* Hartig., and *Pristophora pallipes* Lep.

Each species is dealt with under the headings: Distribution ; Habits of the Adult ; The Egg, Larval, Prepupal, and Pupal Stages ; Duration of the Life Cycle ; Proportion of Sexes ; and Seasonal Variation.

The excellent photographs included in this paper illustrate the adult sawflies, the eggs *in situ*, and the larval, prepupal, and pupal stages.—G. F. W.

***Scolytus destructor* Ol., Notes on the Biology of the Large Elm Bark-Beetle.** By R. C. Fisher (*Forestry*, v, 2, 1931, pp. 120-131 ; 1 plate).—The association between the elm bark-beetle and Dutch elm disease has been suspected for some years, and this paper, in giving a concise account of the life history and habits of the beetle, is intended to be of use for determining more precisely the exact rôle played by the insect in relation to this disease of elm trees.

The main observations deal with the first emergence of beetles in the year, their feeding habits, method of pairing and oviposition, the egg-tunnel, the duration of the various stages in the life cycle, the emergence of new broods, and the subsequent behaviour of the parent brood, and the number of broods and generations in one year.—G. F. W.

Shot Hole Borer, The. By L. M. Smith (*Agr. Ex. to California, Circ. 64*, April 1932, 13 pp.; 6 figs.).—*Scolytus rugulosus* Ratz, generally known as the fruit tree bark-beetle, has become an injurious pest in certain Californian orchards, where it attacks almonds, apricots, cherries, peaches, and prunes.

The life history of the beetle is described in full.

The injury by the adult beetle falls into two categories, viz. twig injury, which is usually accompanied by an appreciable amount of gumming, and limb injury due to the tunnels made through the inner bark and cambium. Larval injury consists of limb girdling.

As the pest is unable to live in healthy, vigorous trees, the factor which is solely responsible for the outbreak is drought—the beetles being able to select weakened trees which show no outward signs of ill-health. Many orchards have been almost completely protected from attack by heavy irrigation. Other methods for increasing the vigour of the trees include the reducing of the tops, cutting back, and judicious manuring. Orchard sanitation should be practised, the most important measure being the removal and destruction by fire of all dead trees and limbs before the end of February.—G. F. W.

Strawberry Blossom Weevil, The. By S. G. Jary (*Jour. S.E. Agric. Coll., Wye*, 30, July 1932, pp. 171-182; 2 plates).—The author has previously given an account (see R.H.S. JOUR. 57, 154) of investigations carried out on *Anthonomus rubi* Herbst. in Hampshire, and this paper supplements the first and includes further laboratory and field observations carried out during 1930 and 1931.

Part I deals with laboratory observations, including technical descriptions of the egg, larva and pupa (with figures), and adult weevil, and feeding habits.

Part II is devoted to an account of field observations, under the sectional headings: Life History and Habits; Appearance in the Field; Oviposition; Host Plants; Nature and Extent of Damage; Varietal Susceptibility and Resistance; Parasitism; and Control Measures.

No satisfactory method of controlling this pest has as yet been discovered.

G. F. W.

Sugar-Beet Nematode, Control of. By G. Thorne (*U.S. Dep. Agr., Farm. Bull.* 1514, Feb. 1932, 20 pp.; 15 figs.).—*Heterodera schachtii* Schmidt has been known to be present in the United States for almost twenty-five years, and its present distribution is shown by means of a map.

The life history is briefly described, and a list of field crops and weeds which act as hosts is given.

The various preventive measures for eliminating this pest from small and large areas are considered.

No successful field method has been devised for clearing the soil by chemical means, and practical control relies entirely on the practice of crop rotation.

G. F. W.

Verbena venosa caused by Aphelenchus ritzema-bosi, Leaf-blotch in. By T. Goodey (*Jour. Helminthology*, ix. 1, Feb. 1931, pp. 17-20; 2 figs.).—*A. ritzema-bosi* is known to attack many greenhouse plants, e.g. Chrysanthemums and Gloxinias, but the number of records of its attacks on hardy plants is smaller but increasing.

The nature and extent of the injury done to the foliage of *Verbena venosa* are described and figured.

A list of twelve species of plants liable to become infected with this species of nematode is given.—G. F. W.

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MASTERS LECTURES, 1932.

GARDEN FERTILITY: ITS ORIGIN AND MAINTENANCE.

By Sir FREDERICK KEEBLE, F.R.S.

[Read May 10, 1932; Sir DANIEL HALL, M.A., F.R.S., Sc.D., in the Chair.
May 11, 1933; Sir ARTHUR HILL, M.A., F.R.S., Sc.D., F.L.S., in the Chair.]

GARDENING, as all who pursue it know full well, is an absorbing and exacting occupation. Those who follow it have but little leisure for systematic study of the art of cultivation. Nevertheless it was by practical men—gardeners and cultivators generally—that the foundations of sound working knowledge of the art of cultivation were laid.

Close and constant contact with the problems of cultivation, frequent failures and fertility of resource in devising rough-and-ready but nevertheless truly scientific ways of remedying them, have enabled generations of men to bring cultivation gradually, but surely, to its present high state of perfection. Nor will the predominant part which practical men have played in developing the art of gardening become less in the future. They bear the heat and burden of the day, and they, by their intimate contact with the problems and their daily experience of the difficulties of cultivation, will remain the pioneers of progress.

Until comparatively recent times the sciences which bear on cultivation—chemistry, physics, plant physiology, mycology and entomology—were in too crude a state to offer more than occasional assistance to the gardener. Now, however, with chemistry and physics being reborn every decade and at every rebirth coming in

closer touch with reality, science is becoming, and will become more and more, a powerful aid to practice. To say this is not to imply that there is any real difference between a practical and a scientific man. There is not ; or at all events there ought not to be. Every practical man who observes and reflects and tries new ways is a scientific man ; and what is more practical than seeking after truth, the quest of the scientific man ?

The development of the physical and biological sciences means, however, that there are now two ways of advance instead of only one way. There is the well-tried practical way of advance which requires for its successful pursuit observation, imagination, enterprise and patience, and running parallel with it is the way of specialized scientific study of this or that aspect of gardening : study, for example, of the laws of inheritance and of the nature of heredity which is already yielding results of the greatest practical value to gardeners, and study of the nature of the soil in relation to the growth and health of plants which is the subject of these lectures.

Before describing some of the advances which are being made in knowledge of soil fertility, it may be pointed out that the scientific study of any practical art such as gardening offers two distinct advantages. Not only does science help the practical man to improve his art, but it also adds to the enjoyment of it. The increased enjoyment is for those who like to solve puzzles and to find every day fresh puzzles which require solution. Science in the garden is such a stimulating companion because the more any commonplace fact of life is considered by its aid, the more miraculous does it appear, and miracles are always exciting. The sunshine which makes the green pigments of a plant also makes to appear in the leaf carotene, the precursor of Vitamin A, the vitamin which augments the powers of resistance of human beings and animals to disease : a substance of uncertain use in the plant kingdom where it is made, but vitally important to the animal kingdom.

Again, that the film of earth on which plants grow should suffice to support the teeming life of the world seems natural enough until the question is asked : How does it do it ? Whence does this slender Atlas derive its perennial powers to sustain the world ?

In well-tended gardens the rich loam which generations of hard-working men have helped Nature to create may extend to three or more than three spits deep : in specially favoured spots the depth of fertile soil is far greater ; but in much of the arable and pasture land of the world the fertility extends no deeper than the depth of a shallow ploughshare. Strip off that single spit of soil, and lo ! all fertility is lost, and years elapse before the sterile subsoil acquires any fertility at all.

The spade-work which Nature does in creating fertile soils has been the subject of much inquiry. The broad lines upon which she works are well known, but the finer details of Nature's operations still await discovery. Yet no subject is more worthy of investigation, for

with fuller knowledge of the origin of soil fertility and ways of maintaining it would come great additions to the health and happiness of mankind.

Nature, in her rôle of soil-maker, works with any of the diverse materials which come to her hand : barren sand and gravel, chalk, limestone or clay stubborn of nature, but of great potential fertility.

She uses all sorts of agents in the pioneering work of making soils fertile—air, rain, sun, frost and soil micro-organisms, as well as plants and animals of larger growth. All these agents are capricious : they create and they destroy. The physical agents break down rock and weather it to soil giving promise of fertility ; they also dissolve away and wash out the mineral plant foods which it may contain. Of the bacteria which Nature sows in the soil, some capture nitrogen from the vast reserves of the atmosphere, combine it with other elements and thereby bring it presently to the use of plants ; but other bacteria which Nature also sows in the soil may undo the work and set the nitrogen free to escape again into the atmosphere whence it came.

Already the problem of soil fertility assumes complexity. It is one which concerns not a mass of inert chemicals, but a living earth harbouring legions of diverse micro-organisms, bacteria, fungi and protozoa. And when Nature has fashioned the tenuous garb which the earth wears, there is offered to the cultivator a patchwork—a coat of many colours—the several hues of which betray in some measure the degree of fertility of the piece to which they each belong : the grey and threadbare garment of the chalk ; the white, yellow or red, loose and inherently poor fabric of the sands ; the rich yellow or brown closely woven stuff of the clays ; and the deep black sumptuous material of the fertile loams in which nitrogen is stored in abundant measure.

There is no need to describe to gardeners what they do when called upon to take over Nature's capricious work and persuade one or other of these soils to become more fertile.

Their first care is to make a soil fit for roots to live in. Of all the precepts of plant physiology the one most useful to the gardener is that plants live a double life. They are at one and the same time aerial and subterranean beings. More than half the troubles which vex the inexperienced gardener are brought about by the uncongenial conditions in which the roots of plants are often compelled to grow. Once it is realized that roots, if they are to do their work properly, require at one and the same time both water and air, all gardeners will follow the practice of the best and make sure that the soil climate, that is the conditions of the water supply, aeration, temperature, as well as the soil-larder, are the best that can be provided. Drainage, liming, the addition of humus and, above all, thorough, frequent and opportune cultivation are the means which must be employed to bring about a steady, progressive improvement of soil conditions. The final result of each and all these operations is the same : the creation of a larger water reservoir in the soil, the establishment of a network of minute passages through which fresh air can circulate

freely, and the formation of a medium in which may thrive not roots only but also the vast and varied armies of soil bacteria and other micro-organisms on whose activities, co-operations and contentions soil fertility in large measure depends.

The operations of drainage, liming, addition of humus, cultivation, although they all lead to increase of soil fertility, do not produce this result in precisely the same way.

The immediate effects of drainage on soils that most need it, namely the heavy clays, are threefold. In the first place, a well-laid system of field drains takes away rapidly much of the water which falls during heavy rains. Instead of all the rain soaking through the whole field much of it descends vertically and quickly to find its way into the drain. Similarly any excess of water which does accumulate in the soil is soon got rid of, so that instead of lying waterlogged after rain the land dries quickly during spells of fine weather. After the drains have done their work there is still left in the soil all the water which the roots of plants are able to absorb ; for the water which roots absorb is not that which fills the interstices of the soil but that which occurs as films on the surfaces of the innumerable soil particles.

Thus the three immediate effects of drainage are : a sufficiency of soil-water, a plentiful supply of air, and a warmer soil.

Cultivation and the addition of humus, the one by pulverizing and the other by opening up the soil, help to make it more permeable to water and so actually help to drain the soil. They have other beneficent effects as well, among which one of the most important is that of increasing the plant foods in the soil—a subject which must be considered in some detail presently.

The effect of liming in improving the texture of heavy soils is due to the power of lime and chalk to flocculate clay, that is to cause its excessively fine particles to cohere in groups. The texture of the soil becomes coarser, and the soil itself less sticky, puddling less readily and working with spade or plough more readily.

Lime has also another important effect on all soils—namely, the encouragement of those soil bacteria which bring nitrogen to the use of plants. Although all soils deficient in lime respond to liming in this latter way, by no means all clay soils respond in the former manner. Some clays are amenable to the influence of lime and some are refractory to it. Large areas of clay land in this country are of the latter kind, and much is so intractable as to make arable cultivation difficult and expensive : cold, wet, winter-waterlogged land : the sullen earth that Shakespeare sang. Gardeners can make something of it, though it is back-breaking work. Beside the methods already described and such expensive luxuries as large-scale addition of sand, there are only two other means : the addition of every bit of solid refuse—clinker, coarse ashes, old bottles, rubble—and burning. The old peasant who keeps his clay fires burning, and by so doing permanently denatures the refractory clays, robbing them of stickiness and puddlesomeness, he, and he alone, can master these obstinate

but inherently fertile soils. Chemistry ought to be able to improve upon the rustic art of the clay-burner, but hitherto it has not succeeded. Experiments now in progress give some, albeit not by any means sure, hope that applications of certain chemicals to these refractory clay soils may induce improvement. The best results have been obtained so far by the use of aluminium sulphate and sulphate of iron (ferrous sulphate) followed by applications of dilute sulphuric acid. The treatment is effective up to a certain point ; but whether it will result in progressive improvement and whether the cost will not be too high cannot yet be stated. Needless to say, were it to become possible to make the large areas of the refractory clay soils of England more amenable to cultivation the benefit to agriculture would be great ; for wide bands of these clays stretch obliquely across the country from Dorset to Lincoln like some clammy poultice on a shivering body. The conjecture might even be hazarded that were these large tracts of cold clay made more porous, not only would their cultivation be more profitable but the climate might lose some of its winter terrors. These considerations serve to emphasize the fact already insisted upon that the winter state of a soil is no less, and perhaps even more, important than is its summer state. Roots have work to do during winter, and the success with which they do it depends on the conditions under which they labour.

The nature of some of the work done by roots during the winter and its importance to the plant may be illustrated by the results of experiments, not yet published, made during the past few years by Mr. G. E. BLACKMAN, Mr. A. H. LEWIS, and other members of the Staff of the Jealott's Hill Agricultural Research Station.

The investigation had for its object to discover why it is that the application of a nitrogen fertilizer to pasture land in February brings about a precocious growth of grass. The fact is well established. A dressing of nitrogen in the form of Nitrochalk or sulphate of ammonia given in the early months of the year makes grass grow so vigorously that it is ready for grazing a fortnight or more earlier than it would have been if no nitrogen had been given. The discovery is manifestly of practical importance not only to farmers but also to gardeners ; for there can be no doubt that what is true of grass will prove to be true of many other plants which, like it, begin their activities in the spring of the year. Some of these would certainly be all the better if they could be induced to make an earlier start. It is for the gardener to consider to what plants this means of speeding up spring growth might be applied with advantage, and then to find out by cautious experiment whether they do indeed respond to nitrogen in the manner that grass does. But it is for the scientific horticulturist to discover to what the quickening effect of nitrogen is due. This we have done.

In order to explain the conclusions to which the experiments point reference must be made to the part played by temperature in regulating the growth of plants.

The rate of growth of a plant is governed by temperature in the

following manner. There is for each kind of plant a minimal temperature at which growth begins.

For example, Maize begins to grow at about 43°F .—that is some eleven degrees above freezing point. Below this temperature it does not grow at all. As the temperature rises, if other conditions remain favourable, the rate of growth increases up till 87°F .—the maximal temperature, after which growth falls off rapidly with increasing temperature and finally comes to a standstill (see fig. 64).

The minimal temperature for growth of the early grasses of a pasture is the same as Maize. Observations made daily during the spring show that when the slowly rising soil temperature reaches this point (43°F .) growth begins both in natural grass and in nitrogen grass, that is grass which has received a dressing of nitrogen fertilizer.

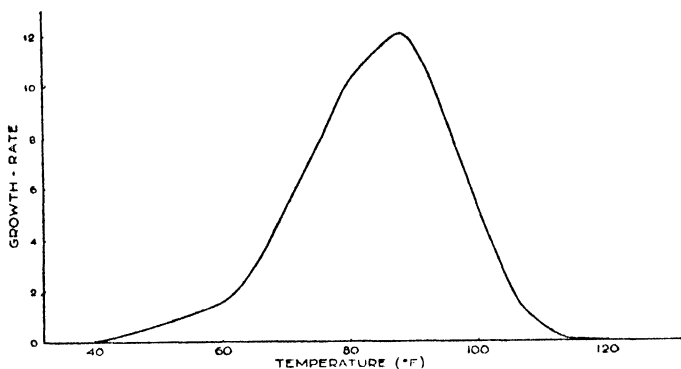


FIG. 64.—GROWTH-TEMPERATURE CURVE FOR MAIZE SEEDLINGS.
(Lehenbauer.)

The only difference between them lies in the rate of growth. In the one case it is extremely slow ; in the other remarkably vigorous.

But, as everyone who grows plants must know, temperature is not the only factor which controls rate of growth. Water may control it ; as witness the standstill of plants in a period of drought, when, although it is warm enough for vigorous growth, none takes place. In like manner the stores of food which a plant contains control rate of growth. For the foods—sugars and nitrogenous (protein) foods—which a plant makes are building materials essential for the work of construction on which its growth depends. If therefore it could be shown that natural grass in early spring is insufficiently supplied with nitrogenous building materials and that nitrogen grass is well supplied, the explanation of their different rates of growth at low spring temperatures would be found.

In order to test this hypothesis it is necessary to find out whether natural grass at the time of the year when growth begins is actually lacking in nitrogen-building materials, and whether nitrogen grass has a plentiful supply of these building materials.

Since all but the very poorest pastures contain plenty of nitrogen in one form or another, the failure of natural grass—if failure there be—

to get enough nitrogen in early spring must be due not to lack of nitrogen in the soil but to the nitrogen not being in a form in which the roots can absorb it. One form in which nitrogen is absorbed by

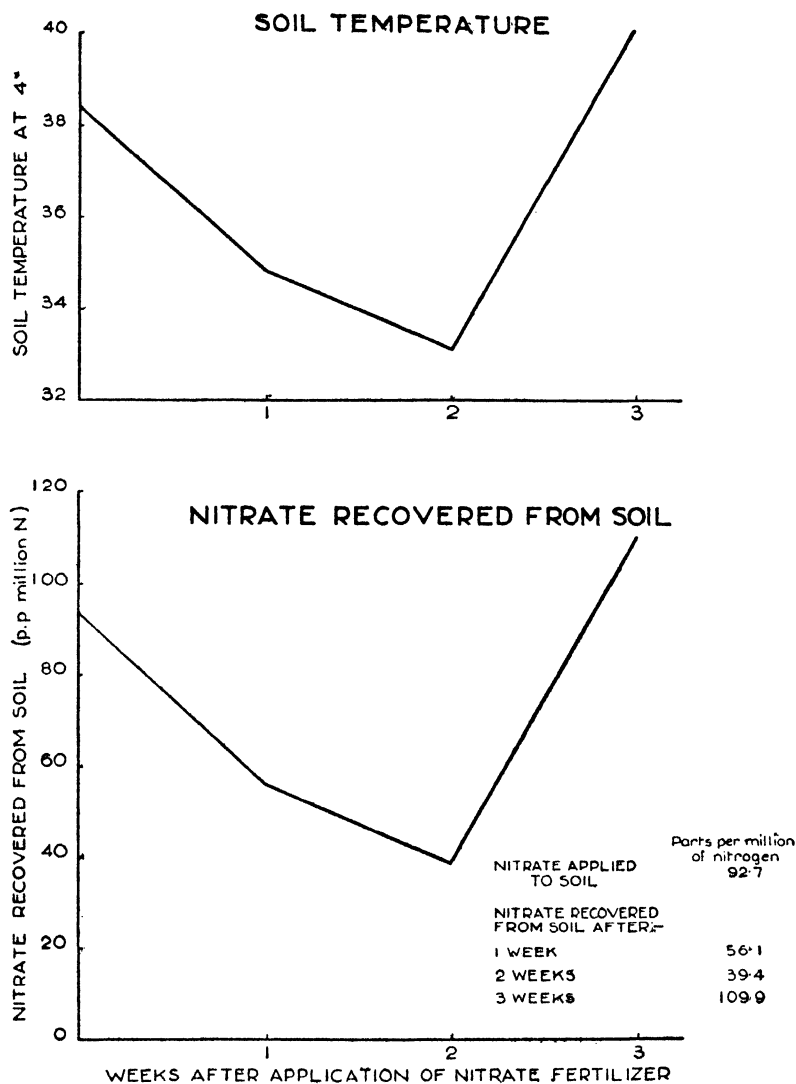
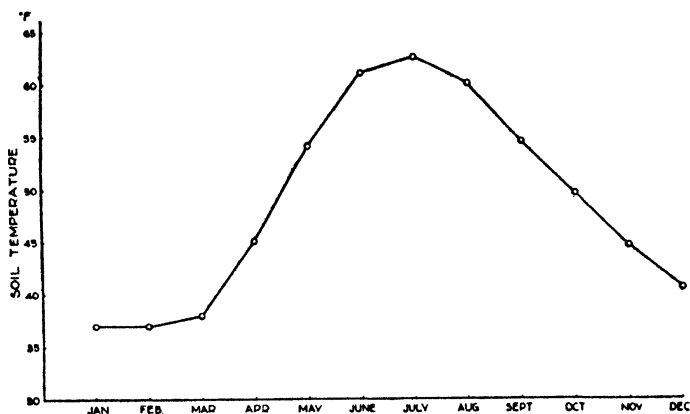


FIG. 65.—THE LOCK-UP OF NITRATE IN THE SOIL IN RELATION TO TEMPERATURE.

plants is nitrate. It therefore becomes necessary to find out whether the soil during the early, cold months of the year does or does not contain nitrate in quantities sufficient for the needs of the grasses.

In order to do this, known quantities of nitrate of soda were added to samples of soil in early spring, and the amount of nitrate nitrogen which could be recovered from the soil was measured at intervals. As is illustrated in fig. 65, when the soil temperature, already low, fell

still lower the amount of nitrate which could be recovered decreased proportionately, and when the temperature rose the amount which could be got back from the soil also rose. This may be taken to mean that at low temperatures nitrate nitrogen in the soil undergoes change into a form unusable by plants. It is locked up in the soil bank—a frozen asset, as it were, as inaccessible and unproductive as hoarded gold. If, however, a liberal addition is made to the natural supplies of soluble nitrogen compounds in the soil, there is more than the soil



VARIATION IN SOIL TEMPERATURE THROUGHOUT THE YEAR
AT FOUR INCHES BELOW PERMANENT PASTURE (JEALOTT'S HILL 1931)

FIG. 66.

can deal with and some fails to get locked up. It remains available to the plant.

This is one part of the story.

The other is no less surprising. It will be remembered that nitrogen grass jumps into activity directly the soil temperature rises above the minimum (43°F.). It must therefore be already supplied with the building material for growth. If so, the nitrogen must have been absorbed by the soil and the nitrogenous building material manufactured by the grass some time between February when nitrogen was added and early April when growth becomes active.

During this time, however, the soil temperature is very low. As fig. 66 shows, it ranges from four or five degrees above freezing point (32°F.) in February to 43°F. in the beginning of April. Therefore, if nitrogen is absorbed by the roots and manufactured into protein during this time, the grass plant must possess remarkable and unsuspected powers of working at very low temperatures.

Measurements of the amount of crude protein in the grass during this period show that the grass plant has these powers. Proteins begin to appear in the nitrogen grass when the soil temperature rises a degree or so above freezing point, and they go on increasing in amount until, when April comes and the soil temperature has got high enough

for growth, the grass contains ample supplies of nitrogen-building materials (see fig. 67).

The explanation of the forcing effect of nitrogen on spring growth is now clear.

The roots of the grasses of natural pastures are ready and able to absorb nitrogen at a temperature below the minimal temperature for growth ; but the soil nitrogen is locked up : little, if any, is available for absorption by the roots. The plant cannot make protein bricks without soil-nitrogen straw, and so, when rising soil temperature is already bringing about vigorous growth in the nitrogen grass, none but the meagrest is to be seen in the natural grass. So slow, indeed, is the release of nitrogen from the soil bank that it is a fortnight or more before the natural grass gets nitrogen from the soil wherewith to

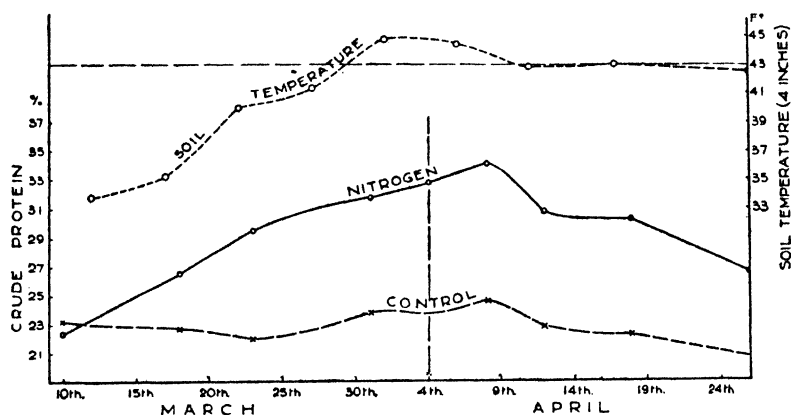


FIG. 67.—INFLUENCE OF NITROGEN ON CRUDE PROTEIN CONTENT OF SPRING GRASS (JEALOTT'S HILL).

construct the nitrogen-building materials in sufficient quantity to provide for sturdy growth (see fig. 68).

It might be supposed that the early flush of growth of the nitrogen grass would be followed by a slacking off in the later part of the year. It is not so. Well begun is half done ! The growth of the nitrogen grass, provided that supplies of nitrogen are maintained, remains throughout the whole year more vigorous than that of natural grass—a fact strikingly illustrated in figs. 69 and 70.

Gardeners who watch with impatient eye the slow unfolding of growth in spring can scarcely fail to find satisfaction in the discovery that the slowness is not wholly inevitable, and that it may prove possible to quicken it, knowing as they now do that the Sleeping Beauty of our gardens must be twice kissed, thermally and chemically, before she awakens from winter sleep.

These facts, interesting in themselves, are no less interesting in their bearing on soil fertility. They show that the bacteria and other micro-organisms of the soil must be taken into full and regular account

in every inquiry into the fertility of the soil. For the locking up of nitrogen is without doubt a biochemical effect. If, for example, nitrate of soda or sulphate of ammonia be added to a sample of soil and attempts made at intervals to recover it, the amount which can be reclaimed varies according to the time at which the attempt is made. A fortnight after the addition it may be possible to get back only 20 per cent. ; a fortnight later 40 per cent. ; but if the soil micro-organisms are put out of action by the administration of an anæsthetic all the nitrogen is recoverable at any time.

The locking up of available nitrogen which takes place when the soil temperature is low also occurs when soil gets dry. In periods of drought growth inevitably slows down and ceases. The plant receives

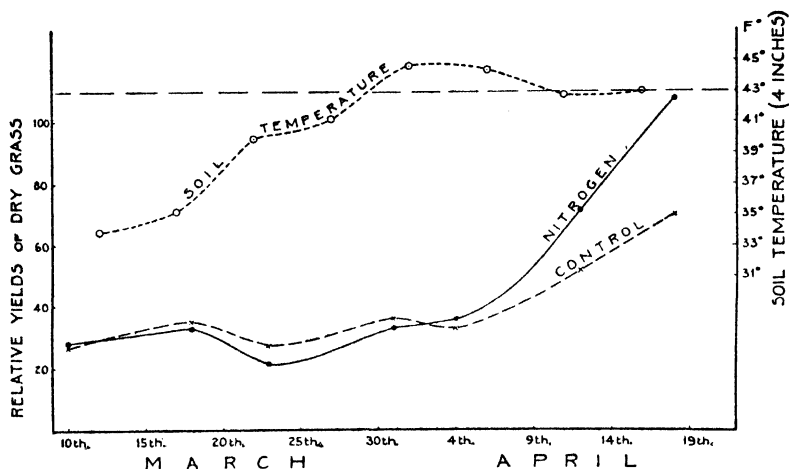


FIG. 68.—INFLUENCE OF NITROGEN ON GROWTH OF SPRING GRASS (JEALOTT'S HILL).

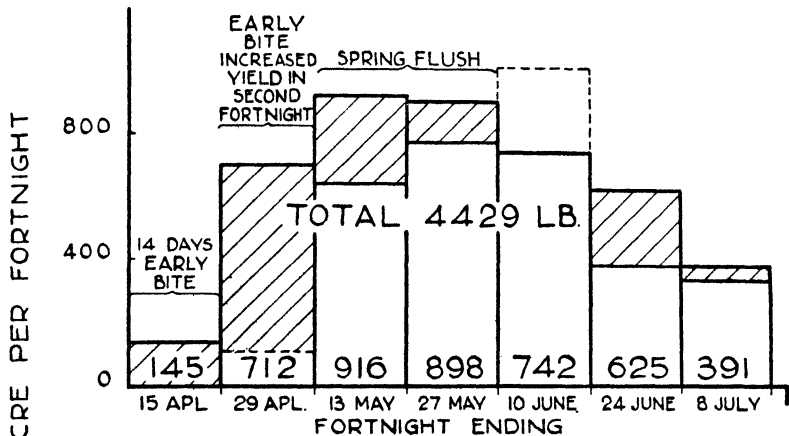
a check from which even after rain has come it recovers but slowly and imperfectly. Nothing but watering betimes will prevent the check ; but nitrogen may mitigate the after-effects. This fact was discovered at Jealott's Hill in the course of experiments on the effect of nitrogen on the growth of grass. During one of the experiments a summer drought occurred. As the graphic record of the results shows (fig. 70), drought caused a cessation of growth on both nitrogen and no-nitrogen grass ; but the nitrogen grass recovered soon, grew away and produced an abundant crop of autumn grass, whereas the grass which had received no nitrogen fertilizer took nearly a fortnight longer before it began to grow with any vigour, and indeed, as the yield shows, did not fully recover during the rest of the season.

It is not impossible that these observations may prove of value in dealing with garden plants in times of drought. Drought in one form or another is not rare in gardens. To give but one example, transplanted shrubs and trees often suffer from drought. Their roots have been injured. The soil may be cold. If it proved that a little

nitrogen is a means of mitigating the effects, our losses would be fewer, and transplanted trees and shrubs might become better specimens.

The discoveries which have been recorded lend support to the practice which is gradually coming into favour of applying to apples

NITROGEN TREATED PLOTS



NO NITROGEN TREATED PLOTS

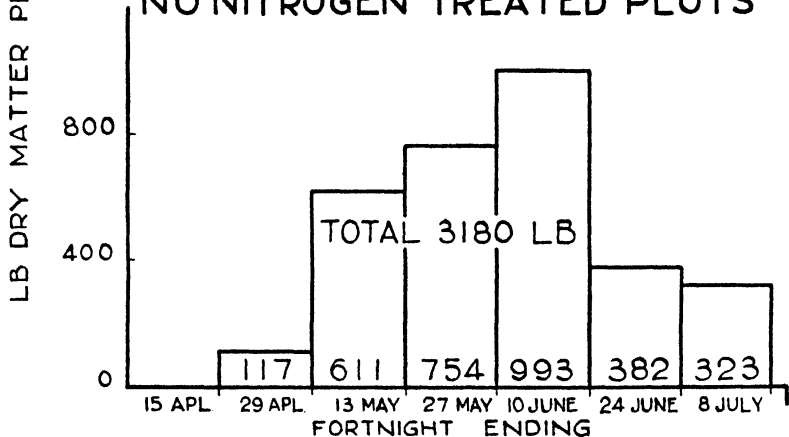


FIG. 69.—EFFECT OF NITROGEN ON EARLINESS AND AMOUNT OF THE SPRING FLUSH OF GRASS.

and other top fruit a dressing of nitrogen in early spring. I am convinced from my own experiments that the practice is a good one. The use of nitrogen in spring suggested itself from a study of the intermittent bearing of certain varieties of apple. There are, as is well known, some kinds which tend to bear biennially. They have "on" and "off" years alternately. It has been shown by investigations at the Long Ashton Research Station that the "off" year is due

to partial nitrogen starvation consequent upon exuberant fruit production in the preceding year. The supplies of nitrogen which the

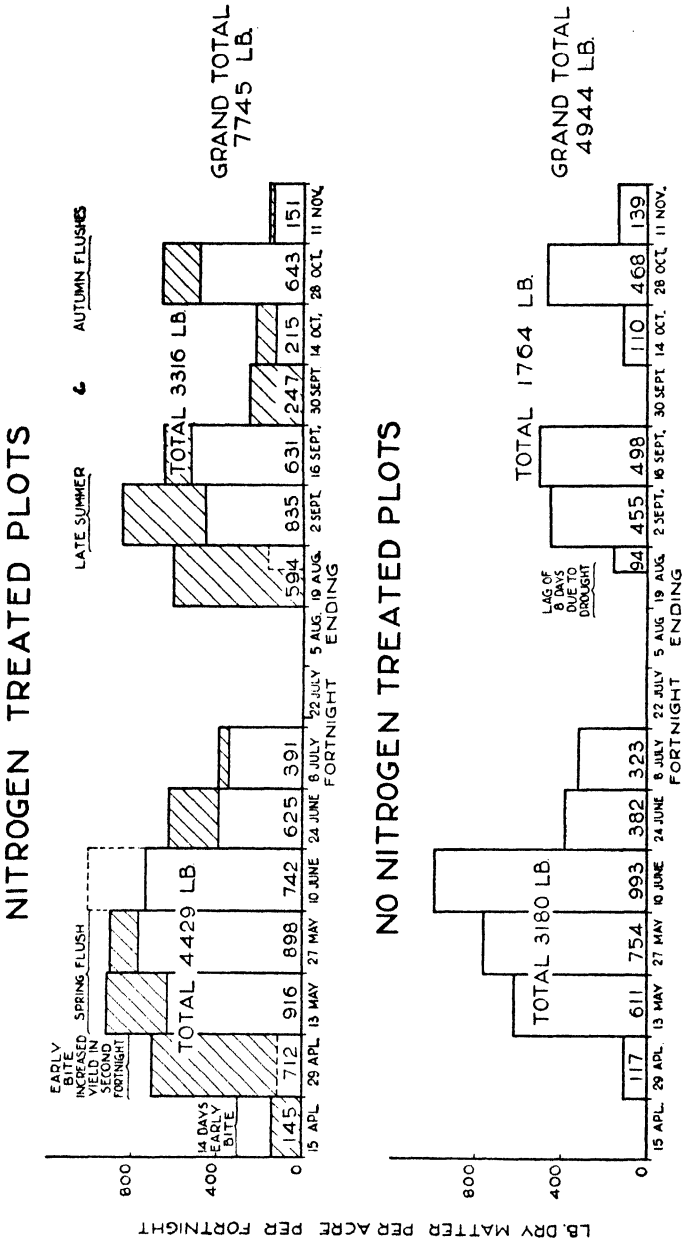


FIG. 70.—EFFECT OF NITROGEN ON TOTAL YIELDS OF GRASS AND ON GROWTH AFTER DROUGHT.

plant contains at the beginning of the " on " year are not enough for both large fruit-production and sufficient leaf-formation. The fruit buds may get what they want, but the leaf buds go short. The leaves remain small. Their work of manufacture is curtailed. Not enough reserves of building material are made during the year, and so next

year the fruit buds are insufficiently nourished. The blossom is weak and the crop poor. If, however, a nitrogen fertilizer is given early in each year, the roots absorb it and therefore, even though fruit buds and fruit are produced lavishly, there is still enough building material for the full development of leaves. The leaves grow large, manufacture to full capacity, and so the trees bear good crops year after year.

The discoveries of the early spring lock-up and slow release of soil nitrogen, the powers of roots to absorb nitrogen at low temperatures and the capacities of plants to synthesize proteins at equally low temperatures all lend an additional sanction to the practice. Further experiments are, however, needed to find out the rate at which nitrogen should be applied and the best time to apply it. Too little will be no good, for it will be all locked up. Too much nitrogen may disturb the balance of growth, producing excess of leaf and stem and too little fruit. It also needs to be discovered whether the early spring dressing should consist of nitrogen only, with subsequent applications of phosphates and potash, or whether better results would be obtained by an early dressing of a complete fertilizer.

The question of the timing of the application of fertilizers just raised is one which comes more into prominence the more the nutrition of plants is studied ; yet so far as I know little experimental work has been done on the timing of applications of plant food to garden plants. Would a dressing of nitrogen in autumn or winter help bulbs, and particularly bulbs in grass, to make better next year's bulbs? The best guidance for experiment is that which is to be got from the plants themselves. They will show when new roots begin to form or old ones become active, and if it is in the cold part of the year nitrogen may prove of great help to them ; but if it is at a time when the soil is warm and contains plenty, the addition of more nitrogen might do more harm than good.

There is, however, the larger question which is bound to be asked : Why lay so much stress on what after all is only one aspect of soil fertility? Why not rely on the old and well-tried garden fertilizer—farmyard manure? The reply is a threefold one. Farmyard manure becomes more and more difficult to get. It does not supply a balanced ration of plant foods. The more the fertility of the earth is studied the more it is found that it is limited almost everywhere by insufficiencies of one or other of the mineral plant foods. There are few soils, even of well-tended gardens, the fertility of which could not be enhanced by supplying their mineral deficiencies. The impoverishment is often well concealed. Plants adjust their growth according to the supplies at their command. Vigorous growth is by no means the chief pre-occupation of the gardener. It is often desirable to restrict growth, and then the deficiencies may be an advantage. Nevertheless, the general run of garden plants—bulbs, flowering shrubs, ornamental trees, and above all fruit trees—are at present only too often grown under conditions of partial starvation, which limit their productivity and beauty and ensure their susceptibility to disease.

When it is realized how numerous are the elements which they require, it is surprising that plants get on as well as they do.

Plants need in addition to hydrogen and oxygen, which they get from water, and carbon, which they absorb as carbon-dioxide from the atmosphere, no fewer than eight elements—nitrogen, phosphorus, potash, calcium, sulphur, magnesium, iron, manganese. Leguminous crops also require boron. In addition to these indispensable elements, plants also contain eight more—fluorine, iodine, chlorine, copper, aluminium, zinc, cobalt and nickel. These latter, which may be called the minor elements of soil fertility, are generally present in sufficient quantities in all soils. Nor is it sure that, although the plant takes them up from the soil, it puts all of them to use. Facts, however, are constantly coming to light which show that lack of any of the major elements and of some of the minor ones leaves a soil infertile.

A disease of tea, known as "tea yellows" in Nyasaland, is due to an insufficiency of sulphur in the soil and is cured by the application of sulphate of ammonia or sulphate of potash to the soil. Dr. WALLACE of Long Ashton has shown that fruit trees growing in soils deficient in magnesium suffer from premature defoliation. Bush sickness of cattle and sheep in certain parts of New Zealand has been found to be due to lack of iron in the soil. The spraying of the pineapple in Hawaii with sulphate of iron puts a complete stop to chlorosis, a serious disease due to an excess of lime in the soil preventing the absorption of iron by the roots. Another form of chlorosis, in oats, is the result of an insufficiency of manganese. Legumes do not thrive without boron, because in its absence the vascular system which gives communication between the root nodules and the plant breaks down. Boron is also essential for tomatoes and melons, and a disease of tobacco in the Dutch East Indies is cured by the application of this element in the soil. The calcareous peat soils of Florida produce miserable crops of tomatoes and other plants unless copper in the form of copper sulphate is added to the soil, and crop failure on reclaimed sands in Holland is remedied by similar means.

These oddities of plant nutrition serve to show how varied and subtle are the influences which mineral foods have on soil fertility and how frequently disease in plants may be traced to soil deficiency in mineral elements often regarded as unessential. Fortunately the cultivator in this country need but rarely preoccupy himself with these minor elements. But he must always preoccupy himself with the four chief plant foods—nitrogen, phosphates, potash and lime. Nor is it enough to be sure that a soil contains all these essential plant foods. They must be present in proper balance, a condition the more difficult to ensure because different crops require a different balance of plant foods.

There are, for example, nitrogen-greedy crops which make large use of nitrogen; chief among them are the small fruits and the plants of the cabbage tribe. Accurate measurements of the capacity of the small fruits to make use of increasing supplies of nitrogen have, so far

as I know, not been made in this country, but measurements relating to the cabbage tribe are available. The illustration (fig. 71) summarizes the results of three years' experiments on the yield of marrow-

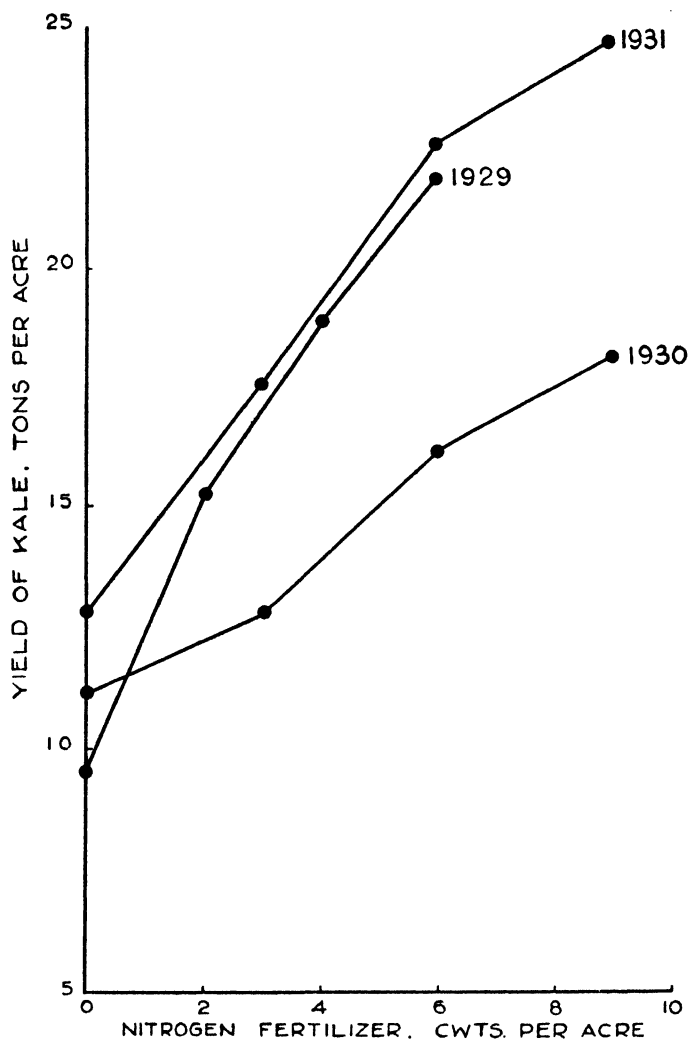


FIG. 71.—INCREASES IN YIELD OF KALE DUE TO NITROGEN AT JEALOTT'S HILL, 1929-31.

stem kale. It shows that there is a steady increase in yield with each increase of nitrogen fertilizer up to so high a rate as 6 cwt. to the acre, and that there is a further great increase when so much as 9 cwt. are given. The records illustrate incidentally the well-known fact that soil fertility, as expressed by crop yields, depends on climatic conditions no less than on a sufficient supply of the plant foods. The kales showed their enjoyment of the wet of 1931 by responding

to the fertilizer in a more generous manner than they did in the preceding drier years.

The root crops—mangolds, sugar beet, potatoes and the radish—grow poorly and also suffer in health unless there is an ample supply of potash in the soil. It might be supposed that most soils contain adequate supplies; but it is not so. Most sandy soils and some heavy soils are deficient in potash.

How widely soils vary in the amounts of plant foods which they contain is illustrated in Table I, which compares the composition of a very good, a good, and a very poor soil.

TABLE I.—CHEMICAL COMPOSITION OF TYPICAL SOILS.
Percentages of Air Dry Soil.

	VERY GOOD. Red River Valley, Manitoba.	GOOD. Yalding, Kent.	VERY POOR. Blackbeath, Surrey.
Loss on ignition	26·3	4·0	2·6
CaCO ₃	—	0·1	<i>nil</i>
Nitrogen	1·0	0·145	0·033
Potash	1·033	0·59	0·025
Potash soluble in 1 per cent. Citric Acid .	0·076	0·044	0·010
Phosphoric Acid	0·288	0·258	0·081
Phosphoric Acid soluble in 1 per cent. Citric Acid	0·054	0·080	0·004
Lime (CaO)	1·89	0·30	0·05

The very good soil is seen to contain thirty times as much nitrogen, forty times as much potash, and more than ten times as much soluble phosphoric acid as the very poor soil. Not only are these essential foods insufficient in the poor soil, but the no less indispensable plant food and soil improver, lime, is nearly forty times less plentiful in the poor soil than it is in the very good one.

In addition to nitrogen-partial and potash-partial plants there are—and they are very numerous—phosphate-partial plants, of which turnip and maize are examples.

This survey of the plant food factor of soil fertility has served as an essential introduction to the inquiry already promised into the uses and virtues of farmyard manure. Its composition (see Table II) would seem to suggest that if farmyard manure could be obtained in plenty

TABLE II.—COMPOSITION OF ANIMAL MANURE.

	N. per cent.	P ₂ O ₅ . per cent.	K ₂ O. per cent.
Bullock	0·63	0·26	0·72
Cow	0·43	0·19	0·44
Horse.	0·54	0·23	0·54
Liquid	0·20	0·03	0·46

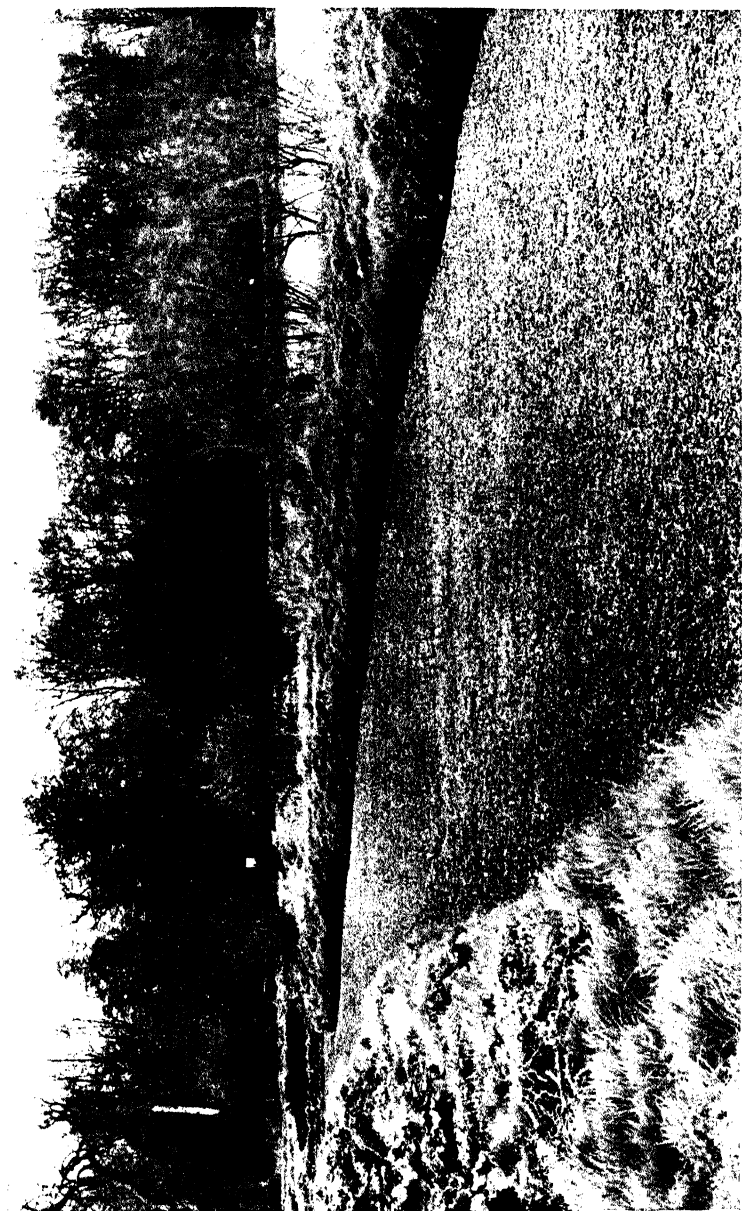


FIG. 72.—THE EFFECT OF FERTILIZERS ON WATER CRESS.
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its use would solve the chief problems of soil deficiency by supplying all the needs of plants for nitrogen and mineral food. This opinion, so often expressed and applied in practice, is responsible for more bad cultivation than any other, and it is therefore not wholly a misfortune that, invaluable though it be, farmyard manure is no longer available in such large quantities or at so low a price as it used to be. This fact notwithstanding, every good gardener will, pending fuller knowledge, rightly continue to supply liberal dressings of farmyard manure to all parts of garden land where high crop production is required.

The trouble with farmyard manure lies not in what it contains but in what it lacks. The three chief plant foods—nitrogen, phosphates and potash—are not mutually replaceable. A sufficiency of one cannot compensate for a deficiency of another, and therefore a due balance must be maintained between the three. The composition of farmyard manure seems to indicate that it contains nitrogen, phosphates and potash in a very suitable proportion ; but the value of any natural or artificial fertilizer lies not in what it contains but in what it yields up to the plant. The soil itself may and does intervene between the absorbing root and the plant food which the root seeks. The soil, as has been shown, may lock up nitrogen, and it also plays strange pranks with phosphates. How strange are these pranks is illustrated by a balance sheet which was drawn up at Jealott's Hill after an ordinary four-course rotation on the farm (Table III). The balance sheet shows

TABLE III.—BALANCE SHEET OF NITROGEN AND MINERAL FOODS SUPPLIED TO AND USED BY THE PLANT.

	Amounts supplied. lb. per acre.			Amounts removed. lb. per acre.		
	N.	P ₂ O ₅ .	K ₂ O.	N.	P ₂ O ₅ .	K ₂ O.
Roots	55	85	107	130	43	222
Spring Corn	23	46	23	51	20	42
Seeds	46	—	—	67	22	78
Wheat	46	46	23	71	30	41
Total applied in artificial fertilizer	170	177	153	—	—	—
Total applied in 12½ tons farmyard manure	131	42	181	—	—	—
	301	219	334	319	115	383

N = Nitrogen. P₂O₅ = Phosphoric Acid. K₂O = Potash.

how much of each of the chief plant foods was supplied to the crops of the rotation and how much of these materials the crops took up from the soil. It proves that the crops absorbed more nitrogen and more potash than was supplied in the fertilizers ; but that only one-half of the phosphoric acid provided by the fertilizer was removed by the crops. Yet experience insists that, unless the full amount of phosphoric acid had been applied, the plants would have been starved of phosphates and the crop yields would have diminished. Practice has discovered

that the soil intervenes very arbitrarily between the plant and phosphates, appropriating to its own uses at least one-half of the total phosphates given as fertilizer.

Now the analysis of farmyard manure (Table II) shows that it contains between one-half and one-third as much phosphoric acid as nitrogen, and it might therefore be supposed that that would be just about enough to supply plants with all they need. It would be, if the phosphoric acid contained in farmyard manure were as readily available to the plant as is the phosphoric acid contained in the soluble phosphates generally supplied in fertilizers. But phosphates in farmyard manure are not so readily available, and of the total phosphoric acid which it contains little more than one-quarter gets into the plant. It therefore follows that anybody who relies exclusively on the use of farmyard manure for supplying soil deficiencies in plant food runs the risk of growing plants under conditions of partial phosphate starvation. When, therefore, the gardener uses farmyard manure he must see to it that he makes it into a complete fertilizer by supplementing it with phosphates of a suitable kind, and if the crop which is to be grown needs plenty of potash he must add this plant food as well.

The study of phosphates in relation to soil fertility opens up questions of yet greater importance. It has been shown that under farm conditions phosphates tend to become immobilized in the soil and in consequence useless to crops. The all but universal experience of agriculture is that the soils of the world are limited in their fertility by lack of phosphates. It is generally supposed that this disappearance of phosphates from the surface of the earth is an inevitable occurrence, but the suggestion may be made that it is not : that the locking up of phosphates in the soil is due to the fact that the natural soils of the world are perforce left to themselves and the agricultural land, owing to the economics of production, is insufficiently cultivated. Following this train of thought, it may be conjectured that loss of phosphates from arable land may not be irremediable ; that thorough cultivation, such as is practised in gardens, may be found to keep the phosphates of arable farm land in a more mobile condition.

In order to test this conjecture, garden and arable farm soils at the Research Station at Jealott's Hill were analysed (Table IV). It was

TABLE IV.—GARDEN AND FARM SOILS, JEALOTT'S HILL.

	GARDEN. Hawthorndale.	FARM.	
		12-acre field.	Church Field.
Nitrogen	0·272	0·15	0·123
Potash (K_2O) (citric sol.)	0·0347	0·02	0·021
Phosphoric Acid (P_2O_5) (citric sol.)	0·1034	0·012	0·006

found as a result of the analyses that whereas the amount of nitrogen in the two soils did not differ very greatly, and whereas the two soils

differed very little with respect to potash, there was a large difference in the amount of phosphates they contained. The garden soil contained more than eight times as much available phosphate as did one arable field and more than seventeen times as much as another.

These facts support the suggestion which has just been put forward sufficiently to justify a more general investigation of the amount of phosphoric acid in soils which are comparable in all other respects except that those of one series are from well-cultivated garden land and the other from farm land under ordinary arable cultivation.

The results of the comparison should help to prove or disprove the hypothesis that soil phosphates when they go out of use do so, not because the soil inevitably lays hold of them, but because insufficient cultivation prevents the activity in the soil of micro-organisms, which are concerned in keeping soil phosphates in vital circulation—that is to say, in either preventing their permanent lock-up or recovering them from the locked-up state and converting them into forms usable by the plant.

Whether the proposed Chemical Soil Survey support this hypothesis or not it would almost certainly disclose a general shortage of phosphates even in garden soils. For crop production in gardens is fairly high, and the larger the crop the greater is the amount of phosphates and other plant foods taken from the soil. Most gardens are content to rely on farmyard manure to supply deficiencies and, as has been shown, farmyard manure is itself none too well provided with available phosphates.

I have satisfied myself by rough-and-ready experiments made on a rich heavy loam in which roses grow well that the addition of ammonium phosphate, which supplies both nitrogen and also phosphates in a soluble form, has a beneficial effect on vigour and floriferousness, and also helps in some measure to reduce black spot, the worst enemy of the Rose—a fact which supports the conjecture which may be hazarded that most if not all diseases whatsoever are deficiency diseases.

The reference just made to the effect of phosphates in reducing the incidence of black spot in roses opens up a line of inquiry which, though it has been pursued already with success, deserves to be followed farther and more closely. It is known, thanks to the investigations at Long Ashton and East Malling, that leaf scorch of apples is a deficiency disease. Apples suffering from it have rusty leaves and small fruits. When potash is applied to the soil, the leaves become healthy and the fruits large.

The more crops are studied, the more extraordinary are found to be the reactions of plants to deficiencies of the essential plant foods. Who would suspect that plants find in a mineral substance (potash) a partial substitute for sunshine? Yet so it is. Rothamsted has shown that the addition of potash salts to the soil exerts a more beneficial effect on crop production in relatively sunless years than it does in sunny seasons. The explanation of this strange fact seems

to be that in addition to other services to the plant, potash makes the chlorophyll machinery more efficient. The chlorophyll machinery which builds up sugars used by and stored in plants is driven by the energy of sunlight. In sunny years the high power of sunlight suffices to make even an imperfect chlorophyll machine run satisfactorily, but in sunless summers only that machine which is rendered of high efficiency by the presence of potash is able to maintain a satisfactory output.

The observation is of special interest in any inquiry into soil fertility, because it illustrates a fact never to be lost sight of by the cultivator: that soil and climatic conditions interlock with one another in determining the fecundity of plants. This property of potash is interesting also in another way. Many experiments have been made into the effect of potash in bringing about a higher coloration of apples. The results are discordant; but when they are looked into it seems that, whereas in America—a sunny land—potash has little effect, in this country of duller skies it has a remarkable effect on coloration. Although not very much is known of the physiology of pigment formation in the apple, it may be that when sunlight is deficient potash helps the development of the pigment in the skin of the fruit, but when sunlight is plentiful the abundance of sunshine compensates for any lack of potash. In any case, experiments carried out at Long Ashton have demonstrated in striking manner that potash does improve colour in apples. Certain varieties of apple were so grown that half the roots were supplied with potash and the other half left without. The apples on the potash half of the tree became red, but on the no-potash half they remained green!

The special aptitudes of plants to make large use of one or other of the chief plant foods, to which reference has already been made, may be illustrated by the behaviour of the potato and beetroot. It is some years since Rothamsted discovered that nitrogen and potash stand in a peculiar relation to one another in their effects on the yield of potatoes, and a similar relation has been discovered at Jealott's Hill in the case of the sugar beet. The accompanying illustration (fig. 73) indicates the nature of the relation.

A dressing of a moderate amount of nitrogen and potash fertilizers brings about a certain increase in yield. The use of a fertilizer containing the same amount of potash but twice the amount of nitrogen increases the yield of the "roots," but decreases somewhat that of the tops. A fertilizer containing the same amount of potash but three times the amount of nitrogen produces no further increase of the roots, although the tops grow larger; but when the potash is increased at the same time as the nitrogen, there is another jump in production, and both roots and tops show increase. If, however, a further increase in the amount of potash contained in the fertilizer is made, the yield is actually less than it was in the previous case, so that unless the two plant foods are applied in due quantity and in the right proportions the best effects cannot be expected.

A final illustration may be given of the complexity of the problem of soil fertility. It arose, as is so often the case, in the course of an

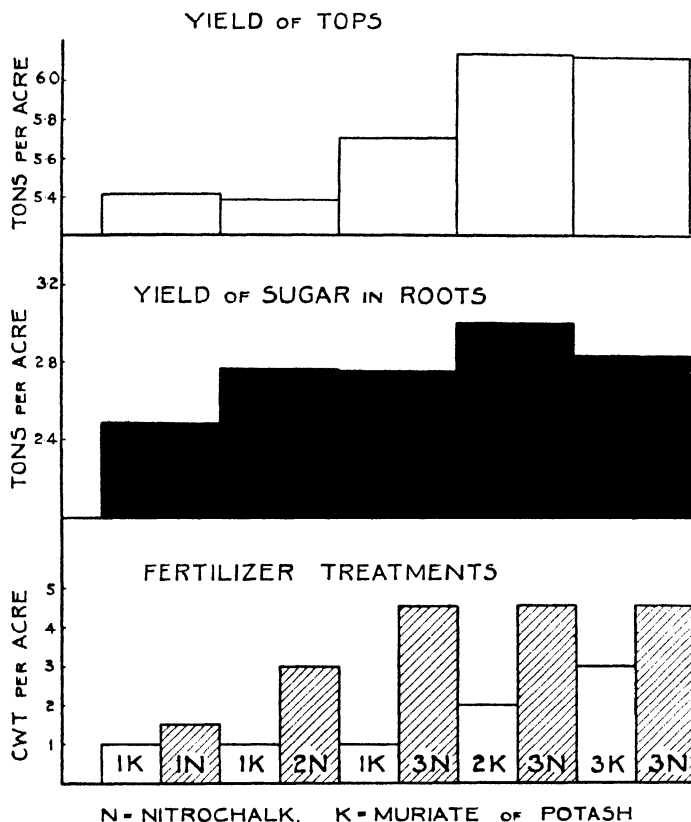


FIG. 73.—RESPONSE OF SUGAR BEET TO BALANCED AND UNBALANCED MANURING WITH POTASH AND NITROGEN (JEALOTT'S HILL, 1929).

experiment designed with some other purpose. The experiment consisted in growing potatoes in ground supplied with different quantities of plant food (see Table V).

TABLE V.—COMPARATIVE YIELDS OF POTATOS GROWN WITH FARMYARD MANURE AND WITH COMPLETE ARTIFICIAL FERTILIZER.

Dressing.					Tons of Potatos.
(1)	10 tons farmyard manure	*	per acre	.	9.59
(2)	20 tons farmyard manure	*	per acre	.	10.88
(3)	30 tons farmyard manure	*	per acre	.	11.90
(4)	Complete fertilizer	{ 4 cwt. sulphate of ammonia			12.17
		{ 5½ cwt. superphosphate			
		{ 4 cwt. muriate of potash			

* Plus addition of sufficient phosphate and potash for high yields.

Three series of plots were dressed with farmyard manure: one at the rate of 10 tons to the acre, the second at 20 tons, and the third at

30 tons. A fourth series received a liberal dressing of a complete fertilizer—that is, one containing nitrogen, phosphates and potash. The plots of the 30-ton series contained ample supplies of all the essential plant foods, but, in order to ensure that the 10- and 20-ton plots should not be deficient, they received enough phosphates and potash for high yields. It might have been expected that all the plots would have yielded equally well. They did not. The 10-ton plots yielded about $9\frac{1}{2}$ tons, the 20-ton plots yielded nearly 11 tons, the 30-ton plots nearly 12 tons, and the complete fertilizer plots a little over 12 tons.

It may be taken as an agricultural maxim that crops of equal size require for their production about equal quantities of nitrogen. All the farmyard manure plots contained more nitrogen than did the plots dressed only with the complete fertilizer. The approximately equal yields of the 30-ton plots and the complete fertilizer plots may be taken to show that the plants growing therein received about the same amounts of nitrogen. The lower yields of the less heavily dressed plots may be taken similarly to show that the plants which grew in them did not receive a sufficiency of nitrogen and that, though in the midst of plenty, they suffered from partial nitrogen starvation. This can only mean that farmyard manure, though it contains large stores of nitrogen, only pays it out gradually, and that the rate at which the nitrogen is paid out is proportionate to the total quantity contained in the farmyard manure. The 30-ton plots paid it out fast enough, the 20-ton plots not so fast, and the 10-ton plots liberated nitrogen still more slowly.

Like ourselves, plants need plenty of food when they are young and growing. Plants need a lot of nitrogen when they are young, and relatively little when they are grown up. The humus nitrogen of the soil seems to behave like a pedantic parent, following a rule of its own devising, and all imperfectly adapted to the requirements of the plants which it governs. It doles out nitrogen grudgingly when it is most wanted. The growth of the crop reflects the insufficiency, and so the surprising conclusion is reached that, even though a soil may contain a superabundance of nitrogen in organic form, the plants which grow in it may suffer from partial nitrogen starvation in their earliest days.

This parsimony of farmyard manure, and presumably of humus nitrogen generally, has to be taken into account in any study of soil fertility. There are times when a steady outpayment is advantageous ; it will favour a steady and sturdy growth. There are times when it is disadvantageous—namely, when it is important to give plants a good start.

These illustrations all show that scientific knowledge of soil fertility is in its infancy. They are the hints which indicate the directions in which new knowledge must be sought, and they demonstrate that the secrets which govern soil fertility are to be found out only by regarding soil as a living organism, infinite in the variety of the forms

of life which it contains and, like a living organism, ever undergoing change.

I, for my part, feeling as I do how little is known in comparison with what remains to be known, should have no complaint if any cultivator were to observe in the words of Shakespeare's gardener, "I am a poor man with a rake, but I know more than you." I am sure he does, but there is yet more to know, and I shall be content if I have been able to show directions in which new knowledge may be sought.

One last illustration may be given, chosen because of the dramatic way in which it illustrates the poverty of the earth. The scene is a watercress bed (fig. 72). At a point on the hither side of the line which marks the light from the dark area a man stood some months ago and cast "bread," in the form of a complete fertilizer, upon the waters. The fertilizer reached just up to the line between the light and the dark. On this side of the line the cress grew vigorous in leafage and, finding plentiful supplies of food, pushed out into the water relatively few roots. On the other side of the line the plants remained hungry; they threw out many roots in their search for a sufficiency of food. The many floating roots on the darker patch accumulated debris; hence the dirty darkness. The few roots on the fertilizer side collected but little debris and were clean; hence the comparative clarity of this side of the picture. The bread which was cast upon the waters returned in the cress after not very many days.

The picture is a significant hint of the nitrogen and mineral insufficiencies of the world, and an indication that the fecundity of the earth is limited by those deficiencies.

Not by remedying those alone, however, may the fertility be maintained and increased. Drainage, liming, thorough and deep cultivation are the prerequisites, but when they have done their part the earth's fertility will still remain lower than it should be unless plants are supplied, and supplied year by year, with the food materials which they need.

THE ROYAL HORTICULTURAL SOCIETY'S GARDENS, WISLEY :

THE FIRST TWENTY-FIVE YEARS.

BY F. J. CHITTENDEN, F.L.S., V.M.H.

FOR many years prior to its Centenary the Council of the Royal Horticultural Society had been seeking a site better fitted for a garden than that occupied since 1822 at Chiswick, and matters had gone so far that at the Annual Meeting of 1900 proposals were brought forward and adopted for the acquisition of a new garden as a means of celebrating the Society's Centenary in 1904.

Negotiations took place for land at Limpsfield, but this site did not meet the approval of Fellows at a Special Meeting, and another was sought.

Meanwhile the growth of the Society was such that the need for a permanent Exhibition Hall had become more and more urgent, and at a further meeting in 1902 "the principle of building a New Hall" to be opened in 1904 was accepted, but the Council assured the Fellows in its Report for that year that "the provision of a New Garden has by no means been lost sight of," and informed them that negotiations (which the Fellows approved) were in progress for the surrender of the Chiswick lease.

About the middle of 1903 the Council was able to announce the acceptance of the munificent offer of the use of an estate of about sixty acres at Wisley in Surrey made by the late Sir THOMAS HANBURY, V.M.H. On September 24, 1903, a Trust Deed was signed permitting "the Society to use and occupy the Wisley Estate or such portion thereof as the Society may require for the purpose of an Experimental Garden and the Encouragement and Improvement of Scientific and Practical Horticulture in all its branches," so long as the Society exists and is able to use it.

Steps were at once taken to prepare the ground for the Society's purposes and to vacate Chiswick, all usable material of both plants and supplies being transferred, so that by May 1, 1904, the Society was in full possession and work had begun.

The centenary year was, therefore, marked by the provision of both an Exhibition Hall and Offices in Vincent Square (the "Old Hall" now) and a new and larger garden at Wisley.

The Society had by May 1929 been in occupation of "the Wisley Estate" for twenty-five years, and this article is intended to record the progress made during that time.

The "Wisley Estate" was already widely known horticulturally,



FIG. 74.—A WALK IN THE WILD GARDEN, WISLEY.

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FIG. 75.—BIRCHES, *LILIUM GIGANTEUM*, AND *ORNITHOGALUM PYRAMIDALIS*.
SPRING IN THE WILD GARDEN, WISLEY.



FIG. 76.—THE LONG POND, WISLEY, IN SPRING. *MECONOPSIS REGIA* IN FOREGROUND.



FIG. 77.—RHODODENDRONS, PRIMULAS, AND SOLOMON'S SEAL IN THE WILD GARDEN, WISLEY.

for there its late owner, Mr. G. F. WILSON, F.R.S. (sometime Treasurer of the Society), had made a garden.

The Oakwood, Wisley, Estate, formerly The Glebe, had been purchased by Mr. WILSON about thirty years earlier because of the diversified surface and because in the middle of it was an oak wood with a constant water supply and deep alluvial deposits. It was his design to make a wild garden there by naturalizing exotics from all parts of the temperate regions. He constructed two ponds and had made many beds of different soils in which to experiment. There was a total absence of formality in its layout, and planting had been done with regard to the natural features of aspect and soil and water supply, rather than by making sites for special plants by extraneous means.

Mr. WILSON had, however, experimented largely with Lilies and Gentians in different types of soil, as his planting books show, but, like most others who have made attempts in this direction, with little permanent effect.

His garden was one of the first of its kind, and the success that attended his efforts, and his infectious enthusiasm for this type of gardening, had made it famous. It had become a place of pilgrimage, especially to see the bulbous plants he had established, and the Primroses (particularly the blue Primroses which he did so much to develop), the Lilies and the Gentians, the Japanese Irises and the general collection of hardy plants, growing happily in their pleasant setting of Rhododendrons and Azaleas, flowering trees and conifers, which he had planted amid the oaks and birches and on the outskirts of the wood and on the bank above it (figs. 74-77).

There were some fruit trees chosen more for their ornamental effect than for their value as fruit producers; there was little in the way of kitchen garden; and there was no glass.

Mr. WILSON's garden did not occupy a tenth of the estate; the remainder was in the occupation of a farmer and was not in good condition, and much work had to be done to fit suitable parts for garden purposes.

The illustrated account given by Mr. S. T. WRIGHT, the first Superintendent of the garden, who had come there from Chiswick, published in our JOURNAL, 31, pp. 62-76, gives an idea of the principal features of the garden and what could be seen there in 1904-5. The lists of plants given in that article (apart from one or two obviously erroneous names) are interesting for comparison with present-day conditions and the illustrations demonstrate the great growth of some of the trees and shrubs in the twenty-five years that have passed.

During the discussions as to the best means of celebrating the Centenary of the Society it became evident that there was on the part of a majority of the Fellows of the Society a strong feeling that no effort should be spared to secure a new site for a garden, and there was an equally strong opposition to the expenditure of money on a new site at that time on the part of others. Some, indeed, perhaps remembering the difficulties, and one might almost say the disasters,

that had followed the acquisition of the gardens at South Kensington in 1860, questioned the wisdom of having a garden at all. They, however, were in the minority, and the munificent offer of Sir THOMAS HANBURY silenced the opponents of present expenditure. There were still others, however, and there probably still are some, who considered the Council ill-advised in accepting the gift of Wisley, because they thought its soil generally too poor and untypical, and because of its inaccessibility.

The great development of road traction has now made it easily accessible and many thousands of Fellows and others find their way there every year, and experience has shown that the optimism of the first Garden Superintendent regarding the amenability of its soil was thoroughly justified. The soil is not a rich one, but rationally treated it can without undue expenditure be induced to grow most hardy plants well.

Very few gardens possess a soil ideal for the vast majority of plants, and certainly possession of an "ideal loam" would not give a garden any claim to be considered typical of British conditions generally. There is no soil typical of the British Isles. Diversity of soil is one of the characteristics of our land, and it adds no little interest to our efforts to grow plants. There is diversity of soil at Wisley. In the main it consists of very fine sand and silt. Here and there, however, it is much coarser, but for the most part without gravel; and here and there almost clayey, but never heavy. In other places it is rich in decaying vegetable matter, the result of the deposition of leaves on damp soil for untold ages, and of marsh conditions now mitigated by draining. It is bordered by the River Wey, and the water falling on the hills to the south (where the rainfall is 50 per cent. higher than at Wisley itself) percolates through the soil to reach the river. There is thus always water within the reach of the roots of plants over the greater part of its area, and even in the phenomenally dry summers of 1921 and 1929 plants in cultivated ground at Wisley suffered little from lack of water.

Its position, lying as it does in the river valley, with considerable hills not far away to the south, renders it liable to spring frosts, and extremes of temperature both in winter and summer, and, except where sheltered by trees, to strong winds, especially from the north-east and in places from the south-east. Spring frosts and biting winds form the greatest handicap to the growth of plants at Wisley and limit the number of rather tender plants that can be planted with hope of success.

Plants at Wisley are therefore not grown under easy conditions. Those that succeed are likely to succeed in most parts of the British Isles, and in many places to thrive more easily, with the single exception of lime-hating plants, which because the soil is lime-free at Wisley are among its most ornamental inhabitants. It is, in fact, almost an ideal place for "trying plants." Success there means general amenability.

THE OBJECTS OF THE SOCIETY'S GARDEN.

The objects the Council had in view in establishing the garden at Wisley are set out in the JOURNAL, 28, pp. cclxv-cclxvii.

They may be briefly summarized, and the steps taken to accomplish them described.

The objects were :

The cultivation of fruits, vegetables, stove, greenhouse, and especially hardy flowers and plants, trees, shrubs, etc. Trials of new and rare varieties of trees, fruits, flowers and vegetables against established ones. The hybridization of plants and the raising of new varieties. Experiments in the cultivation and treatment of plants of horticultural as opposed to botanical interest. Trials of horticultural appliances and materials. The establishment of a school of horticulture (practical and scientific), and later the addition of a practical scientific department with Laboratory, etc.

With the exception of the hybridization of plants and the raising of new varieties all these activities have been pursued and developed. The John Innes Horticultural Institution, devoted particularly to hybridization experiments with plants, was established within a short time of the Society's removal to Wisley, and this side of the work was not systematically taken up. Certain new things have, however, been raised and widely distributed, particularly the hybrid Barberries, strains of *Iris sibirica* \times *orientalis*, Helianthemums and other plants ; while a considerable number of grapes, hybrid blackberries, apples and plums have been raised and are, or have been, under trial.

The Council announced in 1904 that "Mr. WILSON's wild garden will be carefully preserved and continued," and that wild garden, allowing for the inevitable changes that time brings in the growth and development of plants, remains in all essentials as Mr. WILSON left it. Many of the trees he planted live with all their added value of twenty-five years' steady growth, some of them now being magnificent specimens of their kind, like the fine trees of *Cupressus pisifera squarrosa*, *Sciadopitys verticillata*, *Daphniphyllum glaucescens*, *Prunus Avium fl. pl.*, *Prunus cerasifera Pissartii*, *Kalmia latifolia*, *Arbutus procera*, *Rhododendron fastuosum*, *R. occidentalis*, *R. Thomsonii*, *Pieris japonica* and *P. floribunda*, and so on.

All else is changed, and while changes have often gone on concurrently, conditioned by one another, it will perhaps be best to deal with each separately, so as to give a clearer picture of the several parts.

THE AREA AND PERMANENT EQUIPMENT OF THE GARDEN.

With the exception of the gardener's cottage not far from the Wild Garden, now occupied by the Superintendent of the Floral Department, a thatched fruit room, a small farmhouse, a barn and a few sheds, there were no buildings available on the garden in 1904,

and the first thing taken in hand was the erection of a house for the Superintendent of the Garden (to which was joined a small office and a room for Committee meetings), a cottage for the foreman of the Fruit and Vegetable Department, a series of glasshouses and a station for meteorological instruments.

The meteorological station was transferred from Chiswick (where observations had been made since 1825) at the end of 1903 and erected at Wisley, with the addition of a Campbell Stokes sunshine recorder, a cup anemometer, and a wind vane (see JOURNAL, 29, p. 644, where it is described). Observations began in February 1904 and have been continued daily ever since. The records are transmitted to the Meteorological Office and included in its reports. In 1924 a scheme of correlation of agricultural and horticultural crop records was established by the Ministry of Agriculture, and Wisley forms one of the horticultural stations under this scheme. Its excellent meteorological equipment was further improved at that time by the provision of a Dyne's anemometer and a greater range of soil thermometers.

The glasshouses erected in 1904 consisted of two propagating pits, 80 feet long, a melon house, a fig house, vinery, plant house, and peach house, each 100 feet long, and 400 feet of frames.

In 1911 an orchid house was built in the same range, and in 1912 an alpine house and a series of frames around it were built as an adjunct to the rock garden.

In 1913 an insect-proof orchard house for the investigation of problems of pollination in hardy fruits was built in the bothy yard.

The frames first built were removed to the same position and largely increased in 1920, and a few have been added since.

A new alpine house twice the size of the original was erected in 1926 on a more open site, and a further series of frames for nearly hardy bulbs was erected near by in the following year.

The shed at first used as a potting shed was replaced by a commodious brick potting and packing shed in 1910, and this and all the glasshouses except the alpine houses are heated from a single stoke-hole, at first by tubular boilers but now by Robin Hood boilers with larger capacity, built in 1923, anthracite being the fuel now used.

The farm cottage was at first used as a wholly inadequate bothy for four men. In 1910 a new bothy with seven bedrooms was erected to the west of the glasshouses and a wall cutting off the bothy yard from the rest of the garden was also put up.

In 1911 a residence was built for the Director of the Laboratory at the north end of the garden.

All these buildings were erected upon the land held under the Hanbury Trust, and the Society cannot dispose of them even if it desired to do so.

The growth of the garden and the work generally, coupled with the cessation of cottage building in the neighbourhood prior to the War, rendered the housing of the staff sufficiently near their work quite impossible, and the Council determined to build cottages for some of their workmen.

Additional land of about five acres was acquired at the north end of the trust land, and upon it six cottages were built in 1915. For reasons that will become apparent later it became evident that the available land would not be sufficient for the expansion of the work and collections at Wisley, and an opportunity arising in 1919 for the acquirement of two farms of about 160 acres in all, adjacent to the garden, the Council purchased them together with a number of cottages.

One of the two farms is let, and the other has provided land for expansion and for the time being lightened the difficulty of housing the staff, while in 1924 a further six cottages were built on the new land with the aid of the Government subsidy.

Part of the farm in hand has been planted with larch, chestnut and hazel, all of which will in time, and part of which does already, supply poles, posts and stakes for garden use.

A further three acres was purchased in 1925 to form a shelter belt on the west side of the garden, and is now planted with shelter trees.

The land, therefore, under the Society's control at Wisley comprises about 220 acres, partly let, partly in process of development, mainly garden in one form or another.

A stable, cartshed, carpenter's shop and stores have been erected in the garden, and a fruit exhibition room for the exhibition of fruits in season was put up in 1927.

During the war the old thatched fruit room became derelict and was removed from the wild garden, and one of the farm buildings has been adapted for its purpose. It has an earthen floor and double walls and roof, so that an equable temperature suitable for the keeping of apples can be maintained.

A mess-room and tool-sheds for the men employed at the southern end of the garden were built in the bothy yard in 1926 to replace some wooden sheds hitherto used for the purpose; the men employed at the northern end of the garden are accommodated in one of the farm buildings adjoining the new fruit room.

Reference is made to the Laboratory in the section dealing with the School of Horticulture and Scientific Work.

The staff, including the students, at Wisley soon grew to a considerable one and some provision for recreation was necessary. In the beginning the ground under cultivation was comparatively small and accommodation was provided for football and cricket in what is now the Pinetum, and later in the Seven Acres. With the end of the War the staff was still further increased, and the acquisition of new land made it possible to provide a field especially for these games and not likely to be interfered with by the expansion of the garden as the others had been; this was improved as a cricket ground in 1928-29 and a pavilion was erected in it with the provision for changing, storage of implements, tools, and so on. The pavilion was opened in June 1929 with a cricket match between the staffs at Vincent Square and at Wisley which ended in a tie. The position of all these buildings is shown on the plan (fig. 78).

EQUIPMENT FOR INSTRUCTION AND RESEARCH.

Young men had been trained in horticulture in the Society's Gardens for many years, and the old reports are instructive as to the changes that were found necessary from time to time in order to give them the necessary opportunities. At one time a good number of lectures were provided at Chiswick in the garden itself, but in later years the activities of the education authorities in London enabled attendance at classes outside, and most of the Chiswick lectures were discontinued. One scholarship was available, of the value of £30 a year, given alternately by the Society and the Worshipful Company of Gardeners.

When the garden was removed to Wisley the position was entirely altered. The enlarged area gave a greatly increased opportunity for the training of a larger number, but the isolated position rendered attendance at outside evening classes practically impossible.

Further the Council had continuously been urged to establish experimental and research work upon a proper footing and, as we have seen, had placed this upon its programme.

A start towards the latter was made in 1905, when an announcement was made (see JOURNAL, 31, p. xlviii) that experiments had been commenced at Wisley under the superintendence of Mr. GEORGE MASSEE, V.M.H.

A Laboratory (described in the JOURNAL, 33, pp. 329-346) was erected near the main entrance and opened by the Rt. Hon. LORD AVEBURY in 1907, to provide a lecture room for the students and work rooms and greenhouse for the experimental work which was now definitely undertaken.

After a few years it was determined to extend this side of the Society's work and the Laboratory accommodation was greatly enlarged, the old building being incorporated in the new. This building (fig. 79) was completed in 1916 and is fully described in our JOURNAL, 42, pp. 115-121. This building also contains office accommodation and has proved as useful and fitted for the purposes it was intended to fulfil as it is beautiful.

A water supply was at the same time brought from Ripley for the houses on the estate as well as for the Laboratory, and engines and dynamo provided for the generation of electricity for lighting and driving machinery in the Laboratory and surrounding buildings. The old Laboratory had been provided with acetylene gas for lighting and laboratory purposes, the new had petrol gas installed, and both have proved quite suitable for use where coal gas cannot be obtained.

The small greenhouse attached to the first Laboratory was removed when the new one was built, and part of the orchid house is now used for greenhouse experiments, while various other structures have been erected as needed.

RESEARCH AND EXPERIMENTAL WORK AT WISLEY.

As we have pointed out, Mr. G. MASSEE carried out some experiments at Wisley in 1905-6. In 1907 the handicap of lack of a laboratory was removed and the Director of the new department took up his duties in July of that year. Many matters were proposed for experiment and research, and selection had to be made. Fellows were not slow to make use of the new facilities and many problems of plant treatment were and are propounded by them and referred to Wisley.

To answer these problems offhand is often impossible. Investigation is required, and sometimes the investigation is necessarily a prolonged one. If the problem is of general interest it may be desirable to follow it up fully, and this is as true now as it was then. The work of the department is forced by circumstances to follow many lines and to deal with matters of immediate concern, rather than to restrict itself to one particular problem of a more fundamental character that may or may not have a bearing upon the future of horticulture.

From the first, therefore, the Council has desired that an endeavour should be made to follow out matters that were of immediate moment ; to determine what measures could be taken to deal with them ; and to see so far as possible what broader problem lay behind them, and how the results of research into fundamental problems of plant life could be integrated with common horticultural practice. This can only be done by taking the precise methods of the laboratory and applying them to problems in the garden ; using the garden so far as is possible as a laboratory. From its very nature, because of our ignorance of and lack of control over many of the factors at work outdoors, this is no easy matter ; and for the interpretation of results observed in the garden recourse must be had to more fully controlled experiment in the Laboratory.

Before dealing with the particular problems investigated it may be well to give a brief outline of the growth of the department. For a while, from July 1907, the Director was single-handed and the work was carried on with such aid as the more advanced students were able to render. By 1911 it had grown so much that Mr. A. S. HORNE, B.Sc., was appointed as assistant ; later Mr. A. N. RAWES began his work as assistant for fruit experiments. By 1913 matters had so much advanced as to call for a much enlarged Laboratory, and in July 1914 Dr. KEEBLE took up his duties as Director of the Gardens, and the building of the additional laboratory accommodation was soon afterwards begun.

The War naturally interfered with that, with the increase of staff that had been determined upon, and with the work that had been contemplated. An arrangement was, however, made by which Professor LEFROY became part-time entomologist at Wisley, with Mr. G. F. WILSON as his practical assistant. The Laboratory building was completed

in 1916, but by that time national requirements had claimed the services of all the members of the staff either wholly or in part, and much of the contemplated work was brought to a standstill. Not until 1918 could any advance be made, when Dr. DARBISHIRE, M.A., who had been interned at Ruehlen, was released, and commenced work on certain chemical analyses, largely in connexion with war-time food. By the end of the War the services of Dr. KEEBLE, Dr. HORNE, and Professor LEFROY were no longer available, but Capt. H. G. PAGE, B.Sc., took up his duties as chief chemist in 1919 (followed, on his resignation to become chief chemist at Rothamsted in 1920, by Dr. DARBISHIRE), and Mr. G. F. WILSON to become entomologist. Mr. W. J. DOWSON, M.A., was appointed mycologist in 1920; and Mr. N. K. GOULD as assistant botanist, mainly with teaching duties, in 1921.

The staff so remained until October 1927, when the second of the two chief officers under the Director, Mr. M. A. H. TINCKER, M.A., M.Sc., was appointed to be keeper of the Laboratory. Dr. DOWSON (both Mr. HORNE and Mr. DOWSON gained the degree of Doctor of Science in the University of London, largely on the work they were able to do at Wisley) resigned on his appointment as mycologist to the Government of Tasmania in 1928, and Mr. D. GREEN, M.Sc., was appointed in his place.

Special investigations have been carried out in the Laboratory also by the late Mr. J. K. RAMSBOTTOM (in appreciation of which a tablet has been placed in the Hall of the Laboratory) and by Mr. J. WOOD; and voluntary investigational work has been done by the late Mr. CROSFIELD and by Mr. B. BUXTON.

The equipment of the Laboratory has been gradual, as various apparatus has been needed, and in addition to that purchased we have to thank several kind donors for pieces of apparatus of great value, and especially for microscopes and lenses, spectroscopes and cameras.

Accounts have been published of much of the work carried out by the Laboratory staff; some that has been in progress for a longer or shorter time has not yet been fully reported upon; some has merely been summarized in a word or two in various reports; some has related to particular problems of restricted application, and has not been referred to further. The summary (see Appendix, p. 278), by no means complete, may serve to show the lines along which work has been done, the conclusions reached, and their application to garden practice. References are included so that the fuller account may be consulted.

Among the subjects proposed for experimental investigation at the opening of the Laboratory were soil sterilization and its effect on the soil population and on plants subsequently grown; etherization of plants; and certain plant diseases.

Experiments were started on soil sterilization and a considerable amount of information was accumulated, but this branch of work was then being taken up by Rothamsted and explored with all the resources of that great establishment, and its pursuit was therefore dropped as

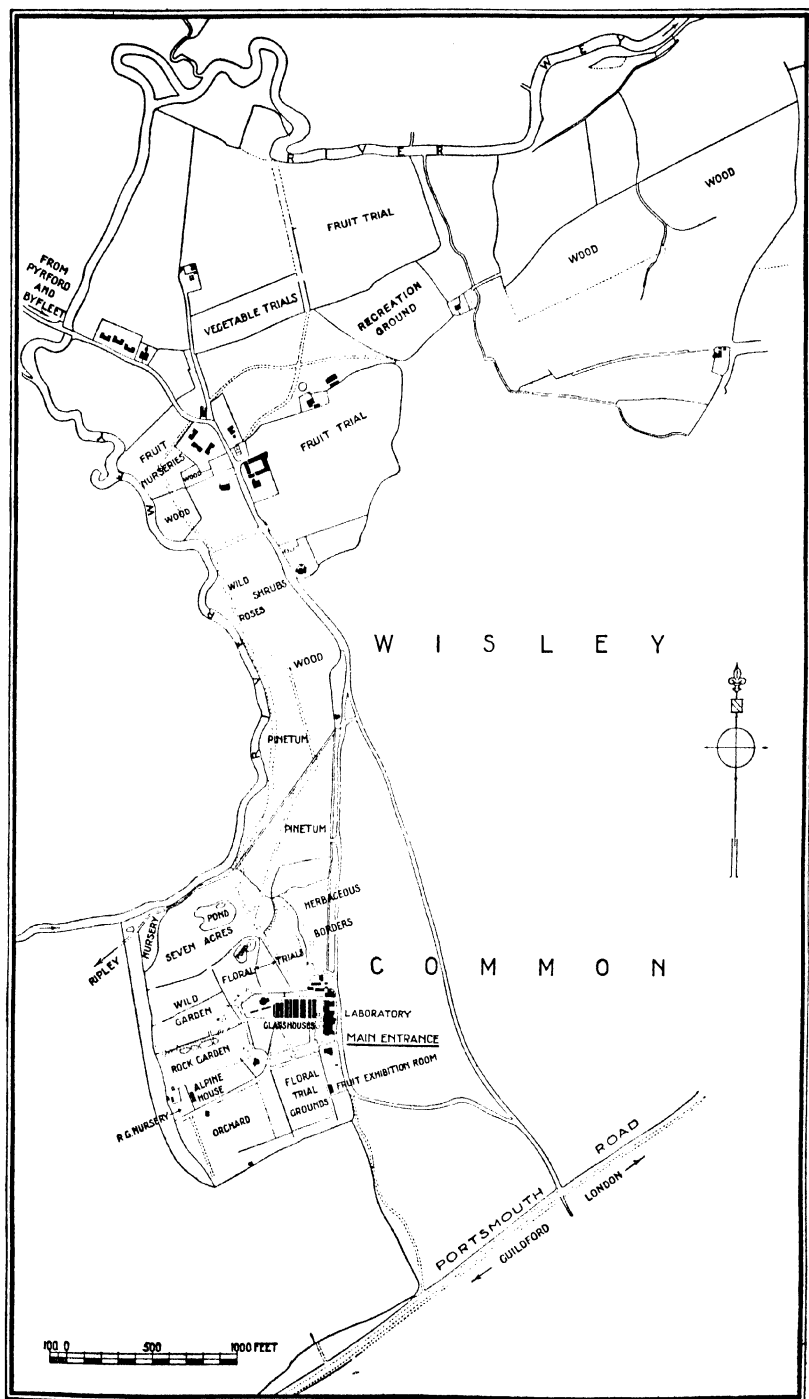


FIG. 78.



FIG. 79.—THE LABORATORY AND THE TERRACE WALK, WISLEY.

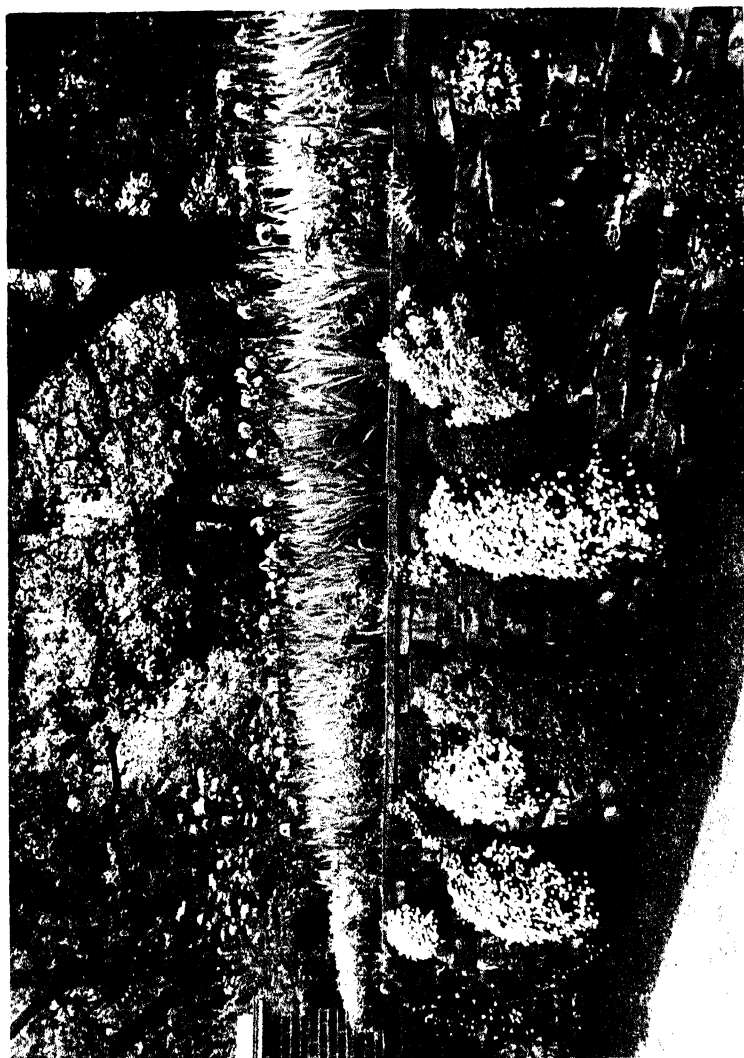


FIG. 80.---ROCK-WALL, WISLEY, FACING NORTH, NEAR ENTRANCE.



FIG. 81. —THE ROCK GARDEN, *CRYPTOMERIA JAPONICA ELEGANS* AND THE LONG POND, WISLEY.



FIG. 82.—THE ROCK GARDEN, WISLEY.



FIG. 83. THE ROCK GARDEN, WISLEY.



FIG. 84.—THE ROCK GARDEN, WISLEY.



FIG. 85.—*PRIMULA WINTERI* IN THE ROCK GARDEN, WISLEY.



FIG. 86.—LOOKING FROM THE ROCK GARDEN TO THE WILD GARDEN, WISLEY.
AMELANCHIER CANADENSIS IN FLOWER.



FIG. 87.—THE ALPINE MEADOW, WISLEY.

[To face p. 267.

being beyond the resources of the Laboratory. It led to great developments at Rothamsted and a special Laboratory for research in this and allied problems as applied to market gardening under glass was subsequently established, which developed into the Lea Valley Experiment Station. With this work only demonstrations were made, and the same with etherization and warm-bath treatment of plants. The latter corroborated and extended the work begun by JOHANNSEN and MOLISCH in forcing plants into rapid growth and showed some of its limitations; some of the results obtained found an unlooked-for application in subsequent researches into the treatment of eelworm diseases of plants, materially shortening the time required for these investigations.

ORGANIZED HORTICULTURAL INSTRUCTION AT WISLEY.

Young men had been received to train in gardening at Chiswick and South Kensington for at least half a century and various systems had been adopted from time to time, and some famous names are on the old records of the Society.

When the garden was removed to Wisley, however, the need for systematic instruction became greater than it had been at Chiswick, and it was determined both to increase the number of young men in the school and to rearrange it so as to provide definite instruction in the principles of horticulture as well as thorough practice in the operations.

The new system came into operation in October 1907. It provided for the instruction of thirty young men of ages between 16 and 22 for two years in practical work in the garden, and in the Laboratory in botany, chemistry and physics in their application to plant growth. It had for its object the laying of a sound general foundation such as would serve anyone who intended to follow a horticultural career in any special direction. It did not aim to turn out the finished gardener; it left the young man to follow his special bent and to gain further experience in the particular branch he determined to take up after the foundation had been laid.

The details of the course are set out in the prospectus of the school (see JOURNAL, 33, pp. 339-346, and 34, pp. 303-4). To those who did good work during their two years at Wisley and also passed a creditable examination in both the operations and principles of horticulture the Wisley School Diploma was awarded.

The school has been practically full ever since it started, except for the period of the Great War, and nearly three hundred young men have passed through it.

A few who entered found practical gardening not to their liking, and took up some other work, and force of circumstances led a few others to other avocations, but the vast majority who have passed through the school are following horticulture in one form or another as a profession. Twenty-one, alas, lost their lives in the Great War,

as the Memorial to them erected in the Hall of the Laboratory records.

As was expected, no one particular branch of gardening attracted an outstanding majority. The scholars of the school have become fruit or market growers, nurserymen, florists, landscape gardeners, gardeners in private gardens or parks, instructors in the counties, horticultural inspectors and so on. A few have gone abroad to fill positions such as these, but most are at work in the British Isles.

Immediately after the War a number of demobilized men were accommodated in temporary buildings at Wisley and instructed in fruit and vegetable growing, in the hope that this would enable them to make a livelihood, and some at least of them were started upon a gardening career.

In addition to this, from time to time provision has been made for men too old to take the ordinary students' course to gain an insight into practical garden work in special directions, particularly in fruit and flower growing.

The small Laboratory built in 1907 served as a centre for all this instruction and the much larger building completed in 1916 has greatly increased facilities for it, as well as for the work of the staff.

The students received no pay, and maintained themselves, but scholarships were provided which assisted some in meeting this expense. The chief of these scholarships were two provided annually by the Society sufficient to meet all maintenance charges for two years, awarded to sons of gardeners, or those in a similar walk of life, who have already had three or four years' practical garden work. These scholarships were first offered in 1924: one general scholarship offered annually alternately by the Society and the Worshipful Company of Gardeners of the value of £50 a year for two years, and the Knott Scholarship offered in alternate years of £30 a year for two years.

The former has been in existence since before the school was arranged upon its present lines, the latter was founded by Sir JAMES KNOTT in 1919. Both were open to all young men of the specified ages and were awarded on the results of an examination in general knowledge held in the spring of each year.

Several county education authorities and corporations have given scholarships tenable at Wisley from time to time, mostly carrying full or partial maintenance, and many of the young men who have come with these scholarships have subsequently come to fill important places in the horticultural world.

In almost all instances the granting of a scholarship has carried with it remission of fees by the Society, and the Society has also supplemented the grants made by the Surrey Education Committee to their scholars.

A prize fund was started for the students by a gift of £100 in 1907 by the late Mr. ARTHUR SUTTON, V.M.H., and this was added to a sum collected for a memorial to the late Mr. GEORGE NICHOLSON, V.M.H. These two sums were invested, and the income is annually expended

in books for those who make the best progress during their course, one special prize being called the Nicholson Prize, given to the student who has exhibited the greatest power of observation.

The Annual Reports of the Society give the names of holders of the School Diploma and prizes and winners of scholarships.

The direct connexion between Wisley and the practical examinations for the National Diploma, established by the Society in 1913, should also be mentioned here. Though the examinations are not in themselves of the nature of instruction they are an aid thereto. The National Diploma calls for a searching test of professional skill and knowledge and the practical examinations were at first held in various gardens in different parts of the country to which the examiners journeyed. It was, however, found better in every way to bring the candidates to one centre so that the same standard might be maintained, and Wisley was chosen and has remained the centre ever since.

The practical examinations for the Teacher's Advanced Certificate are also held at Wisley every year.

The instructors in practical gardening are the Keeper of the Garden and the Superintendents of the Fruit and Vegetable, Floral and Rock Garden Departments. Mr. CARTWRIGHT instructs in the making of meteorological observations, and the Laboratory staff, each in his special section, gives instruction in the sciences ancillary to horticulture.

THE DEVELOPMENT OF THE GARDEN.

No more can be done in a brief history than to record the development of main features and the major changes made in a garden, for a garden calls for continual minor rearrangements, and if it grows in area various changes of a minor nature are often called for to bring its several parts into harmony with one another.

The bulk of the wild garden remains unchanged in essence from the time Mr. WILSON died, but plants have grown and some have had to be moved to make room for this growth. Part, after his death, became overgrown with bramble, birch and *Rhododendron ponticum*, and this has been cleared; the old winter shelters built for Camellias and for some of the *Rhododendron* species proving unnecessary, have been destroyed and different grouping has been made here and there, but the *Vacciniums* and *Phormium* still flourish, *Gaultheria procumbens* carpets the ground and *G. Shallon* grows into thickets. *Daphniphyllum glaucescens* still flourishes. *Liquidambar styraciflua* is a magnificent glowing beacon in October, *Cupressus pisifera squarrosa* forms big trees, *Sciadopitys verticillata* cones nearly every year, the lovely grey Cedar, *Cedrus atlantica glauca*, towers among the oaks, *Primula japonica* has spread in many colours to form a wonderful sight in early summer, *Pratia angulata* still crops up in the paths and *Maianthemum bifolium*, *Cornus canadensis*, *Schizocodon soldanelloides*, *Shortia galacifolia*, *Galax aphylla*, *Epigaea repens*, *Trilliums*, *Thalictrum anemonoides*,

Arisaema proboscideum, *Gentiana asclepiadea* and a whole host of other plants flourish in their accustomed places. *Lilium giganteum*, *L. rubellum*, *L. Parryi*, *L. Hansonii*, *L. japonicum*, *L. pardalinum*, *L. superbum*, *L. Martagon* and its deep-coloured forms, and a very few *L. auratum* still grow there, and there are hosts of other bulbous plants, flowering there in their due season. The few plants of *Narcissus cyclamineus*, *N. triandrus* and *N. Bulbocodium* Mr. WILSON knew have increased to thousands happily at home in the places they have colonized. The woodland Campanulas and the ferns, the Japanese Irises and the great-leaved Gunnera still occupy much the same places as when the Society first came to Wisley.

The first major operation towards the development of the Gardens was the building of the necessary greenhouses, and the cleaning of the land around the wild garden (which was foul with couch grass) before planting, and the making of paths of access.

A wide drive was made from a new entrance (the entrance to Mr. WILSON's garden had been to the north of the farm sheds) to the foreman's cottage above the wild garden, where stands the finest tree on the estate, an oak; this drive was bordered by wide cultivated beds in which hybrid tea roses were subsequently planted, with climbing roses on tripods near the back, backed by the hornbeam hedges planted in 1904-5 which are now a familiar feature.

A transverse path ran down from this to the greenhouses. The land was levelled for the greenhouses and frames and the excavated earth used to make a border along the north side, on which ornamental shrubs and trees were planted. Many of these still remain and have grown into fine specimens without any form of manure in the very unpromising looking subsoil of which the bed was composed. *Clerodendron trichotomum*, *Elaeagnus angustifolius* (until it was smashed by the snowstorm of Christmas 1927), *Eucommia ulmoides*, *Hamamelis arborea* and *H. Zuccariniana*, *Castanopsis chrysophylla*, *Halesia carolina*, *Aegle Sepiaria*, the fine plant of *Berberis stenophylla*, *Paliurus australis*, and *Parrotia persica* perhaps deserve especial mention.

Other plantings of ornamental trees and shrubs made at that time in the field called Seven Acres (which being arable was then sown with grass) and on the bank above the long pond in the wild garden were not so successful. Most of the latter were removed a few years afterwards and those in Seven Acres did not begin to grow till 1919, though they struggled for existence.

The land on the south side of the hornbeam hedge just referred to, after it had been cleaned, was planted in the western half with a collection of the best apples, pears, plums, quinces and small fruits, and most of these, with the additions made from time to time, with the exception of the plums, still remain (new plantations of currants, gooseberries, etc., of course replacing old from time to time).

The remainder was, until 1926, used as a vegetable trial ground. The apples and pears have grown into good trees and cropped well in spite of those who prophesied failure for them on the light soil.



FIG. 88.—HEATH GARDEN AT WISLEY.

[*To face p. 270.*]



FIG. 89.—*ERICA CARNEA* VARIETIES, AND OTHER HEATHS AT WISLEY.

The grass land on the north of the drive was, between 1907 and 1910, planted with conifers (some like *Cupressus macrocarpa* as seedlings out of small pots) and hollies, and, however much one may regret the fact that they are where they are, they have for the most part grown into creditable specimens of their kind and at any rate show the habit that may be expected of them.

The whole of this slope showed a tendency to slide towards the greenhouses and in 1908 stone blocks of various sizes were placed along its base to a height of eight feet or so, and the spaces between planted with various rock plants. The stones served the purpose of staying the slide and the bank remained unaltered until 1922, when it was moved back several feet to give better access to the houses and to allow of a wider path to the wild garden.

The subsequent history of this part of the garden was determined by the enlargement of the Laboratory in 1914-16. After the War the frames immediately in front at its northern end were removed and the ground terraced to correspond with the varied heights of the building, Sussex sandstone being used for the retaining walls, which were planted with rock plants and finally capped with slabs of York stone (figs. 79, 80). The ground was levelled and sown with grass, and two lily ponds—one heated to contain the blue *Nymphaea stellata*—were made. The main entrance was altered, the original drive being removed and a lawn made. The road front of the Laboratory was also terraced later and similar walls were made; a wall with oak gates was erected across the garage drive, and in 1925 a wall with iron gates to commemorate the late Secretary, the Rev. W. WILKS, was erected from designs by Mr. EDWARD WHITE. The opening of the garden on Sundays during summer rendered the erection of a gate-house necessary, and the present one was built by the garden staff from designs by Messrs. IMRIE and ANGELL, the architects for the Laboratory.

In 1925 the wide gravel path with roses on each side, to which reference has been made, was altered by the great reduction of the width of the path and the making of rose beds in turf, the roses planted being those that had proved good garden varieties in the trials, the transverse path being planted with wild roses and old garden varieties.

Meanwhile the land originally set aside for floral trials had proved inadequate, and in 1926 the vegetable trials were removed to a new site at the northern end of the garden, and the land so set free was divided by hornbeam hedges into convenient areas for the various trials which had been determined upon. At the same time a central space was sown with grass and herbaceous borders were formed, the northern boundary hedge being removed in 1929 so as to open this area to the rose walk. The collections of Irises, Delphiniums, Asters, herbaceous Phloxes, Veronicas, Early-flowering Chrysanthemums, hardy Fuchsias, and a few other "Standard collections" are accommodated in these areas.

In 1911 the rock garden was constructed by Messrs. PULHAM to designs by Mr. EDWARD WHITE, with sandstone from Tunbridge

Wells. It was built on the western half of the grassy bank above the long ponds, then occupied by a number of scattered trees. The group of conifers at the western end of the ponds, the fine *Cryptomeria japonica elegans* half-way up the slope, and the belt of oaks and firs on the higher parts were all brought into the scheme, and the water was provided partly by a natural spring near the top of the slope and partly from a large hidden tank which obtains its supplies by a pump from the lower part of the ground. A moraine and bog were incorporated in the scheme, and in its main features the rock garden is as it was then (figs. 81-86). The building commencing in January, planting began in August 1911, *Juniperus communis compressa* in the moraine and *Prunus subhirtella pendula* near the top being the first plants put in. A special officer was placed in charge, and this part of the garden with its houses and nursery and the ground adjacent constitutes a separate department under a Superintendent, the remaining flowers and ornamental plants are under another Superintendent, the fruits (except fruit trials) and vegetables under a third, all working under the immediate direction of the Keeper of the Gardens, Mr. FINDLAY.

The eastern end of the grassy slope was planted with fruit trees and shrubs, and many of these have been removed from time to time and the numerous paths that intersected it reduced. The original "rockery" at its northern corner has been devoted to Yuccas and dwarf conifers and thus harmonizes with the bamboo walk which was planted when the Society first took possession of the land, replacing the hedge of *Prunus cerasifera* that occupied this site then. Many plants of dwarf stature have been planted in the grass of this slope, and in 1928, by the generosity of Mr. MARK FENWICK and with the aid of his artistic taste, some large rocks were placed upon it to bring it more naturally into agreement with the rock garden, and these were added in 1929 (fig. 87).

Japanese Maples and hybrid Rhododendrons were planted about 1908 to 1912 on each side of the upper walk above the slope, where a poultry yard existed in 1904, and they now form a distinct feature of this part of the garden, and with the oaks and firs already alluded to, the bamboo walk, and the wild garden, frame it.

The western and northern sides of the wood in the wild garden, which were overgrown with nettles and brambles, were cleared in 1911 to 1913, part of the space so obtained being used for the Himalayan Rhododendrons and part being planted in 1913 with a variety of "American plants" which have now attained considerable size and character. A fernery and heath garden were also made in the wood about the same time, but have since been removed, the fernery to the sides of a natural stream at the northern end of "Seven Acres," the heaths being accommodated in the more suitable open area in "Seven Acres" itself.

"Seven Acres" was a rather rough pasture abutting upon the western side of Mr. WILSON's wild garden. It was bounded by a small stream at its north-eastern end, by a public footpath along the bank

of the River Wey on the west, and by pastures (part of which are now occupied by the shelter belt already referred to) on the south.

A good many ornamental trees were planted in 1905 in this area, but none made satisfactory growth and the field had come to be looked upon as useless for garden purposes. However, in 1919 so large a number of new shrubs and trees had accumulated, raised mainly from seed sent home in the preceding years by FARRER from Kansu and by FORREST from other parts of Western China and the Tibetan border, that space had to be found for them, and the field was taken in for the purpose. The discovery of small plants of Ling here and there in the grass suggested the making of a Heath garden (figs. 88, 89), and a large gravel pit in the middle of the field was converted into a pond (figs. 90-93). There was no real fault with the soil. The former infertility of the field was due to an iron pan which had to be broken before either roots could penetrate far or water rise to them from the underground stores in summer. The general lay-out and distribution of the principal plants was made with a view to colour effects in autumn and winter, and this was attained without sacrificing the object of finding space for the new plants, so that this area is never at any season without interest. Incidentally it may be noted that it is a garden with much diversity of colour attained without the use of herbaceous plants. The faith that led to the use of the field was justified in the event, for by deep cultivation without the use of manure trees and shrubs have grown extremely well.

The pond was planted with water lilies, and they too have flourished (figs. 90, 91) except in the extremely dry season of 1921, when the pond became dry.

Mr. WILSON's old kitchen garden was turned into floral trial grounds as soon as the Society went to Wisley, and the Chiswick collections of Pæonies and Bearded Irises were planted there after the removal of some of the apple trees which had been planted more for their flowers than for their fruits. Sufficient were left, however, to form a feature, and they and the shelter belt of Austrian Pines have now attained considerable size (fig. 94). Apart from the removal of the nursery beds alongside the nut hedge and the throwing into one of the two round ponds, with the removal of the trout hatchery which Mr. WILSON established in connexion with them, in the main this part of the garden remains unaltered in general character. The rubbish yard was, however, converted in 1911 into an Azalea garden and enclosed by a planting of various bamboos and Gunneras, and as time passed by, various new Chinese shrubs, especially Barberries and Cotoneasters, Pyracanthas and Pyruses. The earliest of the tall Wisley hybrid Barberries form a trellis hedge, and here, too, the Azalea beds are carpeted with the collection of Narcissi presented by the late Mr. BENNETT-POË. The lovely white *Watsonia Ardernei* forms a feature here in summer. It is a quiet, enclosed garden within the garden and has always something of interest for those who may sit here awhile and listen to the birds. Some notable plants in this part of

the garden apart from the naturalized plants along the ditch, where there is always something in flower, summer and winter, are the old Weeping Cherry (*Prunus subhirtella pendula*), the fine double Gean, *Malus floribunda*, *Buddleia magnifica*, the largest *Prunus Pissartii* in the country, *Salix alba regalis* and *Alnus glutinosa imperialis* on the island, *Lathraea clandestina* under the Willow by the pond, the old Mulberry and the fine Medlar near by, *Crataego-mespilus grandiflora* and *Berberis stenophylla* on the mound, *Magnolia acuminata*, *Berberis verruculosa*, *Quercus Cerris horizontalis variegata*, *Crataegus Oxyacantha*, *Lilium Szovitsianum*, *Allium nigrum*, *Gentiana acaulis*, *Colchicum speciosum* and the Wisley hybrid *Iris sibirica* \times *orientalis*.

Mr. WILSON had made his first planting of *Iris Kaempferi*, one of the first in the country, in a ditch through the marshy ground towards the eastern boundary of his estate, and they with other water-loving Irises still grow and flower there. In 1910 a herbaceous border was made along the western bank of this ditch in the place it still occupies, and the lawn in front of it was planted with Daffodils. On the ground near there are now the permanent collections of Violas, spring Crocuses and Hemerocallis. Another border was made to the east of the ditch about 1917, and being moist, considerable numbers of moisture-loving Irises, Astilbes, *Anemone japonica* varieties, Tradescantias and some other herbaceous plants flourish there, while in the grass, still nearer the boundary, Asters and Golden Rods have been naturalized.

The laying out of "Seven Acres" brought the Pinetum, which had been planted with conifers in 1909, more into the garden, and in 1927 a broad walk was made through it, the public right of way being bridged. Conifers on the whole have not flourished, but Pines, Cedars, some Cupressus and a few other things have grown fairly well. Except *Abies nobilis*, most of the Firs are poor, and the Spruces do not grow at all well. Birches and Maples have now been planted among the conifers, and a pleasant walk through the Pinetum and another along the bank of the river both now lead to the northern end of the garden, to the rose and fruit trial grounds.

A place for many wild forms of rose from various parts of the world has been found on the sloping bank along the river beyond the little wood of Scots Pine planted by Mr. WILSON about 1898. The planting was begun in 1919, and further species have been added from time to time, so that now nearly a hundred and fifty find a home here. The flowering lasts from April till July and the rose fruits form a feature for many months. The path passes thence to a collection of Roses used for stocks and of old-fashioned Roses curious from their form or colour or delightful for their scent. Several varieties of the Persian Rose are also here, nearly all the known Moss Roses, many *R. rugosa* hybrids and some Penzance briars, more of the last being planted as a hedge somewhat further along after the Byfleet-Wisley road is crossed.

The alternative path through the Pinetum traverses the pine wood already mentioned, where now many hybrid Rhododendrons have been planted (fig. 95). It then passes into Howard's Field, where



FIG. 90.—THE SEVEN ACRES POND, WISLEY, IN SUMMER.

To face p. 274.



FIG. 91.—THE SEVEN ACRES POND, WISLEY. *BUDDLEIA ALTERNIFOLIA* ON BANK.



FIG. 92.—WEeping WILLOWS BY THE SEVEN ACRES POND, WISLEY, IN WINTER.

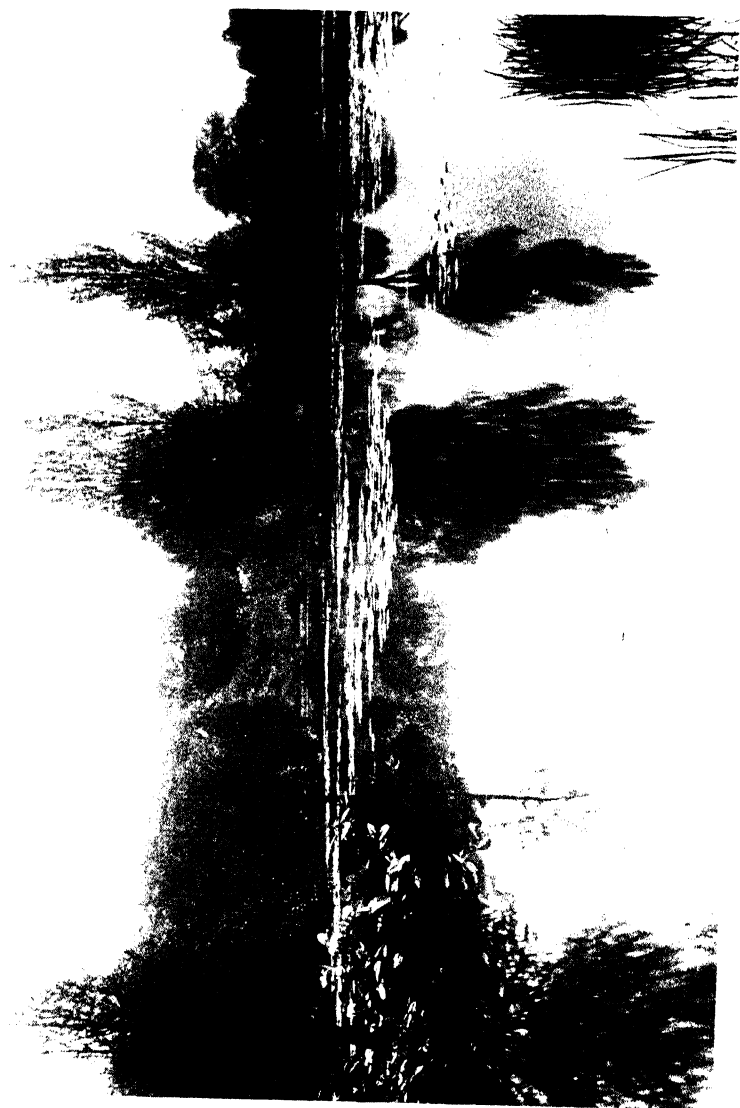


FIG. 93.—THE SEVEN ACRES POND, WISLEY. *POPULUS ALBA BOLLEANA* ON BANK.

in 1911 an orchard of apples for experimental purposes was planted, now for the most part superseded by ornamental trees and shrubs.

A feature of this part of the garden as years pass will be the collection of Lilacs which has been got together for comparison and which contains nearly all the named varieties now in commerce.

Here also are many more of the numerous Chinese trees and shrubs which have reached us during this century and for which space was not available in "Seven Acres."

At its northern end the main path joins the path already dealt with as it passes towards the rose and fruit trial ground.

TRIALS OF GARDEN PLANTS.

Ever since its inception in 1818 the garden of the Society has had for one of its main objects, and for a long period at one time almost its only object, the growth for comparison of the great number of varieties of fruits, flowers and vegetables which have been raised in gardens.

These "trials" have been treated in various ways, and during the past fifteen years have been made more complete and at the same time less discursive and more informative.

The garden is not large enough nor its resources sufficiently great to maintain continuously year by year a complete collection of all the vegetables and flowers commonly raised from seed, and therefore each year a certain number of kinds are selected for trial and as complete a collection as possible of the established varieties of each is grown for comparison with the newer ones.

Each of the principal kinds of annual and biennial vegetables and flowers comes in for trial in turn, once in five, ten or fifteen years according to circumstances and importance.

A scheme for the systematic description of every variety grown was started in 1914 and a member of the staff specially detailed for this work. Varieties most closely resembling one another are grouped together, and during their development their characteristics and behaviour are fully recorded, all records being filed for future reference. The assessment of the value of the varieties for ordinary garden use is made by the appropriate Committee partly on these records, partly on the results of personal inspection by the Committee, and expressed by the Council in terms of awards, "Commended," "Highly Commended," "Award of Merit," and "First Class Certificate."

No awards are now given by the Society to plants usually raised from seed until the Committee has seen the stocks raised and grown at Wisley and is able to judge for itself of the trueness to type as well as of the value for garden purposes and distinctness of the variety.

The trials thus serve four purposes :

(1) They enable the *value of the variety* to be judged after comparison in the same set of conditions with related plants.

(2) They permit *comparisons of stocks* of different varieties to be made.

(3) Classifications based upon horticultural characteristics as well as botanical can be devised as experience is gained over a number of trials of one thing.

(4) Visitors can themselves see and compare the principal varieties with ease.

The system of judging, which is fully described in our Book of Arrangements, removes all unconscious bias, so that the judges are free to judge upon character and performance alone.

The vegetable trials were removed to the northern end of the garden in 1926 and occupy a uniform site set apart for the purpose.

This removal made room for the establishment of standard collections of perennial flowering plants where the varieties that have in the past proved good enough to obtain awards are planted according to a horticultural classification, and new varieties (usually selected by the Committee after exhibition at Vincent Square) are planted side by side with them adjacent to the varieties with which they are to be compared. A list of these standard collections is given in the Book of Arrangements.

The judging is done by the Committees in the same way as with annuals, but since 1921 the garden has been the trial ground for the National Dahlia Society, and from a little later date for the Iris Society for Bearded Irises, the judging in each instance being in the hands of small committees appointed by the respective Societies jointly with the Royal Horticultural Society.

It should be emphasized, perhaps, that the trials at Wisley are judged entirely from the point of view of suitability of the plants for ordinary garden use, and the habit, floriferousness, vigour and general qualities of the plant are taken into consideration in a way impossible when plants are merely before a committee at a show. This has in more than one instance had a marked influence on the type of plant now available for gardens as compared with those in commerce a few years ago, to the great advantage of gardens and incidentally of the nursery-men engaged in the trade with that particular plant.

This method of adjudication involves a longer time than summary judgment at a show, but it is based upon more reliable evidence, and awards made as a result of it are of course of greater value to the public, for whom in the long run the verdict is intended.

A special arrangement has also been made for trials of hardy fruits for commercial purposes, between the Society and Ministry of Agriculture. Full particulars of these trials are given in our JOURNAL, 57, p. 246.

The results of the trials are published as available in the garden press and in our JOURNAL, and lists of Awards are published at intervals in pamphlet form.

The recommendations for the Award of Garden Merit—given to

the most reliable plants for gardens—are also made largely upon plants growing at Wisley, and annotated lists of these are published in our JOURNAL and in pamphlet form.

PLANT AND SEED DISTRIBUTION.

The distribution of surplus plants to Fellows by ballot has been the custom for a very long period. At first the distribution was confined mainly to plants newly introduced as a result of the expeditions made, for instance, to the Americas and it took place at various times in the year. Later this was found to interfere unduly with garden work, and surplus plants were kept to be distributed in March and April, when that interference was reduced to a minimum. It was found, too, that many Fellows welcomed plants and seeds well known in gardens as well as those untried, and instead of throwing away the surplus which inevitably arises in a large garden this also was kept and distributed in the same way. This surplus is augmented by kind gifts of both plants and seeds presented by Fellows to be distributed.

Surplus of all kinds, except of new plants sent in by nurserymen and others for trial, is thus distributed to Fellows who desire it, in proportion to their subscriptions and distance from London, the plants being chosen by Fellows and allotted by ballot.

The main principles of the distribution remain unchanged since the Society came to Wisley, but the vast increase in Fellowship, by 1929 more than three times what it was in 1904, and the greater personal interest taken in their gardens by Fellows, has greatly increased the demand and the labour involved in complying with it. This has necessitated a complete overhaul of the machinery, and by that means not only is the increased work being completed within the same time, but it is done at a smaller cost for packing and postage to the Fellows and with much less disorganization of the work of the Garden than occurred in the earlier years. It might be done with even greater ease and expedition if those requesting plants and seeds would take the trouble to fill up their application forms fully.

For a long time the Society took no share in the various collecting expeditions, but it has joined in many during recent years and the seedlings raised from seed sent home have been distributed very widely. Over three hundred different plants from China alone, of which at least fifty and sometimes several thousand individuals have been distributed, may be found in recent distribution lists. Shares have been taken in the two expeditions made by Mr. FARRER into China and Upper Burma, the 1916–19 Forrest expedition, the two expeditions to Mount Everest (the second abortive, the first not very productive of seeds), several of Captain WARD's expeditions to Western China and the Tibetan marches, Mr. CLARENCE ELLIOTT's expedition to Chile, Mr. BENNETT's to Mt. Garibaldi, Miss HUTCHISON's to Greenland, Mr. COOMBER's to Chile and to Tasmania. From all of these and from great numbers of botanical and horticultural institutions in

various parts of the world with which the Garden is in correspondence, as well as from many kind contributors all over the world, Fellows, old students and friends, seeds have come, and seedlings have been raised and distributed in larger or smaller numbers. Complaints are sometimes made that the plants distributed are small. They are, usually, seedlings or cuttings of the year, but it would be impossible to keep and grow them for longer, both on account of the labour and expense involved and the space occupied, for nearly 150,000 plants are asked for every year.

A fairly complete list of the plants so raised and distributed is given in the Annual Lists of Plants available for distribution, though only those of which there are fair stocks are mentioned in these lists. Some of them, like *Lonicera nitida*, *Buddleia alternifolia*, *B. Davidi nanhoensis*, *Hypericum patulum Forrestii*, *Cotoneaster lactea*, have already become very widely known and grown.

PLANTS ORIGINATING AT WISLEY.

Finally, mention must be made of the number of plants Wisley has contributed to horticulture and which have originated in the Garden in addition to the plants raised from seeds imported from abroad. The Wisley Blue Primrose came from there in Mr. G. F. WILSON's time, but many other things owe their origin to the Garden since. Some have been raised by crossing, others have been selected from seedlings raised, others have been chance seedlings. A few may be named: the hybrid race of *Iris orientalis* and *sibirica*, better than either of its parents; the Wisley strain of *Primula japonica*, the result of constant destruction of poor plants; *Saxifraga Grisebachii*, Wisley variety; the white and China blue forms of *Viola silvestris*; *Aubrietia* varieties; varieties of *Helianthemum*, like Wisley Primrose; the hybrid race of Barberries of the *Polyantha-Wilsonae* group, including *B. × rubrostilla*; a fine form of *Erica carnea* and one of *Daboecia polifolia*; forms of *Osmanthus Delavayi*; the creeping form of *Leptospermum scoparium* (reproducing the wild mountain form of that plant, but raised from a tall parent), and so on.

APPENDIX.

PRINCIPAL EXPERIMENTAL WORK AT WISLEY, 1907-1929.

A. PAPERS DEALING WITH PLANT DISEASES.

1. "Use of Seed from Diseased Tomato Plants." By G. Massee. JOURNAL 32, pp. 170-171 (1907).
Seeds from Tomatos attacked by a variety of diseases were found to produce perfectly healthy plants.
2. "Apple Leaf Spot." By F. J. Chittenden. JOURNAL 33, pp. 500-511 (1908).
The season of 1907 was marked by an outbreak of brown spots upon Apple foliage in many places. The spotting was quite distinct from the marginal scorch which Mr. Wallace has shown to be due to potash starvation. It was shown to be due to the attack of a fungus, *Cladosporium herbarum*, upon tissues weakened by untoward weather conditions, and in



FIG. 94.—*COLCHICUM AUTUMNALE* BENEATH *PINUS NIGRA* VAR. *AUSTRIACA* AT WISLEY.

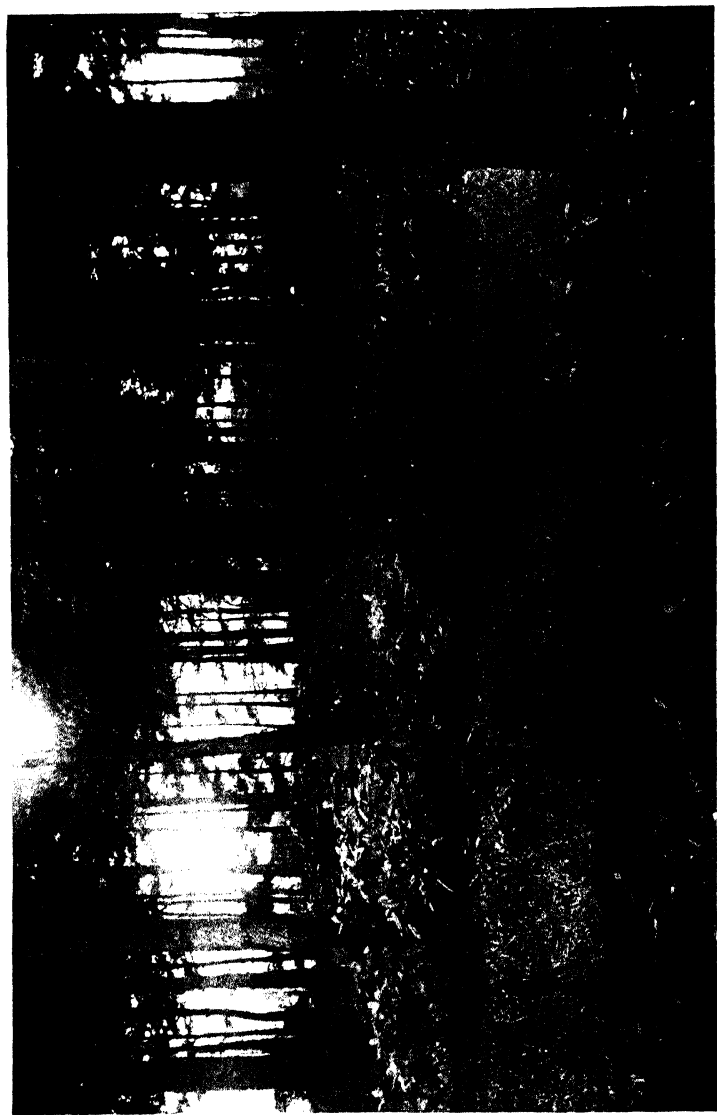


FIG. 95.—RHODODENDRONS IN PINE WOOD, WISLEY. A RECENT ADDITION.

To face p. 279.

general the investigation demonstrated what has so frequently been apparent in the researches into diseases of garden plants, at Wisley, viz. that general derangement of health often precedes serious attacks of many fungi. The best way to avoid disease is to maintain a high standard of general health.

3. "A Disease of the Cineraria." By F. J. Chittenden. JOURNAL 33, pp. 511-513 (1908).

The yellow rust upon the cultivated Cineraria is attributed to the fungus which attacks Groundsel, viz. *Coleosporium senecionis*, and has an alternate stage on the Scots Pine. Measures for preventing spread are suggested.

4. "Azalea Gall (*Exobasidium japonicum*)." By F. J. Chittenden. JOURNAL 34, pp. 45-46 (1908).

A disease of *Rhododendron indicum* (Azalea), then new to Britain, is described, its source and cause stated, and preventive treatment recommended. This disfiguring disease is now frequently met with.

5. "A Disease of *Lavatera trimestris*." By F. J. Chittenden. JOURNAL 35, pp. 213-215 (1909).

A disease of Malvaceous plants new to British gardens and due to *Colletotrichum malvarum* was described, its cause investigated, attempts to check it reported and the probable carriage of infection on seeds pointed out.

6. "A Disease of Antirrhinums." By F. J. Chittenden. JOURNAL 35, pp. 216-217 (1909).

A fungus attack upon Antirrhinums is described for the first time in Great Britain and remedial measures suggested. The fungus, *Septoria antirrhini*, is described. This disease appears but rarely here.

7. "On Potato 'Leaf Blotch' and 'Leaf Curl'." By A. S. Horne, B.Sc. JOURNAL 36, pp. 618-623 (1911).

The first of a series of papers on Potato diseases, dealing in this instance not with observations made directly at Wisley but with diseases that have of late years attracted a great deal of attention and which are still being investigated at various Institutions at home and abroad.

8. "On Tumour and Canker in Potatos." By A. S. Horne. JOURNAL 37, pp. 362-389 (1911).

The disease now called wart disease (first reported in Britain in our JOURNAL in 1902 and there called "tumour"), and the organism connected with it are fully discussed and illustrated, and also corky scab due to *Spongospora scabies*. Lime was found to increase the latter disease.

9. "Bruise in Potato." By A. S. Horne. JOURNAL 38, pp. 40-50 (1912).

This disease (which is differentiated from various other internal derangements of the Potato tuber) is described and the endeavours made to ascertain its cause are detailed. It is concluded that the disease is of physiological origin.

10. "Leaf Blotch in the Potato President." By A. S. Horne. JOURNAL 39, pp. 595-606 (1914).

The disease (see 7 above) which is shown to be due to some other cause than the attack of the fungus *Macrosporium solani* is further described, together with experiments and observations upon it. The disease is shown to be transmissible and in no way correlated with an external character of the tubers, save, perhaps, size, nor is it more abundant when the tubers have been injured.

11. "Blotch and Streak in Potatos." By A. S. Horne. JOURNAL 39, pp. 607-614 (1914).

An account is given of experiments with Potatos showing blotches and streaks in the flesh. External conditions apparently affected the amount of the disease, but diseased tubers tend to produce similarly diseased produce if the conditions are favourable, and badly affected tubers produced very poor plants.

12. "Potato Diseases." By A. S. Horne. Ann. Applied Myc. 2, pp. 183-203 (1914).

A general review of the diseases of Potatos dealing especially with the leaf-curl disease, which was shown to be unconnected with fungus attack, and with the experiments made with insects and Potatos at Wisley.

13. "Leaf-spot of Celery." By F. J. Chittenden. JOURNAL 37, pp. 115-122 (1911).

The destructive leaf-spot disease of Celery is described and its distribution and spread traced. Diseased seed may carry infection and is probably the chief means of introducing the disease into new areas.

14. "A Note on Celery Leaf-spot Diseases." By F. J. Chittenden. *Annals Appl. Biol.* **1**, pp. 204-206.

Infected seed as a source of the Celery leaf-spot is discussed, and the proof of attack upon seedlings by sowing affected seed is given. The rapid increase in the number of infected seed samples on the market is alluded to.

15. "Lettuce Leaf Rot." By F. J. Chittenden. *JOURNAL* **37**, pp. 541-543 (1912).

The first occurrence in Britain of a parasitic disease on Lettuce grown under glass is described together with its cause, the fungus *Marssonina Panattoniana*. Preventive measures are suggested.

16. "Leaf-spot of Campanula." By F. J. Chittenden. *JOURNAL* **37**, pp. 543-545 (1912).

A new disease of *Campanula persicifolia*, the result of the attack of *Ramularia macrospora* upon the foliage is described.

17. "Streak Disease of Sweet Peas." By F. J. Chittenden. *JOURNAL* **37**, pp. 545-550 (1912).

The occurrence of root-rot of Sweet Peas due to the fungus *Thielavia basicola* is described as one of the causes possibly associated with the streak disease of Sweet Peas. [Streak has subsequently been shown to be constantly associated with the presence of a bacterium in the tissues, and transmissible through the seed.] The attacks of this fungus upon the root are shown to be possible only after the plant has been weakened by some cause, as, e.g. overwatering.

18. "American Gooseberry Mildew." By F. J. Chittenden. *JOURNAL* **39**, pp. 373-378 (1913).

An account is given of the outbreaks of American Gooseberry mildew at Wisley and of the effect of spraying with lime-sulphur. Lists of the varieties of Gooseberries, showing how sulphur compounds affect them (many becoming defoliated), form the chief part of the paper.

19. "Iris Leaf-blotch Disease." By J. K. Ramsbottom. *JOURNAL* **40**, pp. 481-492 (1915).

The leaf-spot disease of Irises (mostly of bearded Irises) is described, studies of the fungus detailed, and its identity discussed, and a method of treatment by liming is given.

20. "The Control of Peach Leaf-curl." By Dr. A. S. Horne. *JOURNAL* **41**, pp. 110-114 (1915).

It is shown that, while pruning fails, spraying with Burgundy mixture succeeds in controlling Peach Leaf-curl due to the fungus *Exoascus deformans*. A modified formula for Burgundy mixture more effective than the usual formula is given.

21. "The Control of Plant Diseases due to Fungi in Great Britain." By Dr. A. S. Horne. *JOURNAL* **42**, pp. 13-26 (1916).

A review of the methods of controlling plant diseases is given, with typical examples largely drawn from the author's work as Mycologist at Wisley. Mildew on Michaelmas Daisies and mildew of Roses are especially dealt with.

22. "Silver-leaf Disease." By F. J. Chittenden. *JOURNAL* **45**, pp. 313-315 (1920).

A general account of this now well-known disease, with details of preventive measures.

23. "The Wilt Disease of Asters." By W. J. Dowson, M.A. *JOURNAL* **48**, pp. 38-57 (1923).

A disease attacking Michaelmas Daisies of the *Novibelgii* class and causing the premature withering of the stems is described, together with the life history of the fungus which causes it and methods of preventing it.

24. "Michaelmas Daisy Wilt." By W. J. Dowson. *Gard. Chron.* **71**, p. 63 (1922).

25. "On the Symptoms of Wilting of Michaelmas Daisies produced by a Toxin secreted by a Cephalosporium." By W. J. Dowson. *Trans. Brit. Myc. Soc.* **7** (1922).

These two papers deal with aspects of the same disease.

26. "A New Disease of Sweet Peas." By W. J. Dowson. *JOURNAL* **49**, pp. 211-221 (1924).

A new leaf disease of Sweet Peas due to a fungus hitherto undescribed is fully dealt with, and it is shown that certain external conditions favour the attack, which can be mitigated by sulphur dusting. The fungus concerned is described and illustrated.

27. "A Die-back of Rambler Roses due to *Gnomonia Rubi*." By W. J. Dowson, M.A. JOURNAL, 50, pp. 55-72 (1925).
The fungus described attacks Wichurajana Roses and brambles, and the course of the disease it produces is dealt with in detail, together with the structure and life history of the fungus.
28. "A Blossom Wilt and Stem Rot of Cultivated Antirrhinums and Schizanthus due to *Sclerotinia Sclerotiorum*." By W. J. Dowson, M.A. JOURNAL 51, pp. 252-256 (1926).
The wilting and death of the upper part of Antirrhinum and Schizanthus is traced to its source and fully described. The fungus which causes it attacks a large number of plants, and the conditions favouring its growth are pointed out. Remedial measures are indicated.
29. "Sclerotial Diseases of Narcissi and Snowdrops due to *Botrytis* sp." By W. J. Dowson, M.A. JOURNAL 52, pp. 73-74 (1927).
The Botrytis which attacks Narcissi is briefly described and the symptoms it produces are detailed as seen on the bulb.
This and many other bulb diseases are more fully dealt with in
30. "Some Fungus Diseases of Bulbs." By W. J. Dowson, M.A. JOURNAL 53, pp. 45-54 (1928), and in
31. "Botrytis and Narcissus." By W. J. Dowson, M.A. Gard. Chron. 80, p. 68 (1926).
32. "On the Stem Rot or Wilt Disease of Carnations." By W. J. Dowson, M.A. Annals of Econ. Biol. 16, pp. 261-280 (1928).
It is shown that the disease in Great Britain is due to some other cause than that to which it has been ascribed in other countries and that at different ages different fungi are at work. *Fusarium culmorum* is the cause of the most serious loss. Infection takes place from the soil and is encouraged by relatively high temperature, high humidity, and the presence of wounds, and probably by deep planting. Sterilization of the soil is recommended as the best means of checking the trouble.

B. PAPERS DEALING WITH INSECT AND OTHER ANIMAL PESTS.

33. "Black Currant Gall Mite." By G. Massee. JOURNAL 32, pp. 163-169 (1907).
The method of spread of big bud mites was investigated and the application of grease suggested as a means of checking migration from old to new buds. The suspicion that hazel big bud mite may pass to Black Currants and vice versa is shown to be unfounded.
34. "A Note on the Habits of the Narcissus Fly." By F. J. CHITTENDEN. JOURNAL 37, pp. 122-123 (1911).
The feeding of the grubs of the Narcissus fly in the bulbs of *Habranthus pratensis* and *Vallota purpurea* is recorded.
35. "The Wisley Turnip Fly Trap." By Prof. H. M. Lefroy. JOURNAL 40, pp. 269-271 (1914).
A simple trap—a sledge with a sticky surface—was devised and successfully used to clear the turnip-fly from rows of seedling Cruciferous plants.
36. "On Keeping Orchards Clean." By Prof. H. M. Lefroy. JOURNAL 41, pp. 28-39 (1915).
A summary of the insect attacks upon hardy fruit trees, especially with reference to the methods of dealing with them.
37. "Winter Washes tried at Wisley, 1914-15." By Prof. H. M. Lefroy. JOURNAL 41, pp. 230-233 (1915).
The winter washes then available are compared for their power of cleansing trees.
38. "Flies in Manure Heaps." By Prof. H. M. Lefroy. Prof. Zool. Soc. 1915.
Deals with the methods of preventing flies from breeding in manure heaps.
39. "Effects produced by Sucking Insects and Red Spider upon Potato Foliage." By A. S. Horne and H. M. Lefroy. Annals Appl. Biol. 1, pp. 370-386 (1915).
The symptoms produced by the attacks of various insects upon Potatoes are fully described and illustrated.
40. "The Occurrence of Fungi on *Aleurodes vaporariorum* in Britain." By A. S. Horne. Annals Appl. Biol. 2, pp. 109-111 (1915).
The fungi found to attack the greenhouse white fly and partly to check its increase at Wisley are described. It was at this time that the parasite

of white fly now well known was discovered at Wisley and widely distributed with beneficial results. Unfortunately it did its work so well that the parasite died out at Wisley, having no white fly to feed upon.

41. "Investigations on the Narcissus Disease." By J. K. Ramsbottom. JOURNAL 43, pp. 51-64 (1917).

An account of investigations which established the connexion between the "ring disease" of Narcissi and the eelworm *Tylenchus devastatrix* (*T. dipsaci*). The rôle of *Fusarium* in causing Narcissus diseases is also considered. *Scilla nutans* is shown to be susceptible to the eelworm attack. A method of testing soils for the presence of the eelworms is described.

42. "Experiments on the Control of Eelworm Disease of Narcissi." By J. K. Ramsbottom. JOURNAL 43, pp. 65-78 (1918).

The method of treating Narcissus bulbs in a warm bath at 110° F. for 3 to 4 hours is shown to be the only one of many tried capable of destroying the eelworms in the bulbs. This method is now universally used where eelworm attacks occur, many millions of bulbs being treated annually.

43. "Experiments on the Control of Narcissus Eelworm in the Field." By J. K. Ramsbottom, N.D.H. JOURNAL 44, pp. 68-72 (1919).

Experiments were made to ascertain whether treatment of soils in the open with various disinfectants could be used as a means of ridding the soil of the Narcissus eelworm. None of the substances used was successful in this.

Experiments were also made to ascertain what other plants were susceptible to the attack of the Narcissus eelworm, and the onion was the only one of many crops that became infected.

44. "*Thereva plebeia* as a Pest of Economic Importance." By G. F. Wilson, N.D.H. JOURNAL 49, pp. 197-202 (1924).

These soil-living larvæ are shown to be injurious to many garden plants. The structure and life of the insect are described.

45. "*Thereva plebeia* larvæ attacking Cabbages and Potatos." By G. F. Wilson. Entom. Month. Mag. 1924, pp. 16-17.

46. "The Eelworm Disease of Phloxes." By G. F. Wilson, N.D.H. JOURNAL 49, pp. 203-210 (1924).

The cause of the leaf-curl disease of herbaceous Phloxes is traced to the attack of an eelworm and the use of clean roots as cuttings by which to raise a clean stock of plants is described.

47. "Insect Pests of Rhododendrons." By G. F. Wilson, N.D.H. JOURNAL 50, pp. 46-54 (1925).

Full descriptions of the various insects attacking Rhododendrons in this country are given, and methods of dealing with them are propounded.

48. "Tetrachlorethane as a Greenhouse Fumigant." By G. F. Wilson. Gard. Chron., p. 138 (1926).

49. "*Otiorrhynchus rugifrons* and *O. sulcatus* as Pests of Alpine Plants." By G. F. Wilson. Ent. Month. Mag., 1923, pp. 38-39.

50. "The Mining Habit of *Otiorrhynchus rugifrons* larva." By G. F. Wilson. Ent. Month. Mag., 1925, pp. 273-276.

Further notes on the destructive habits of this weevil among alpine plants.

51. "Insect Visitors to Sap-exudations of Trees." By G. F. Wilson. Trans. Ent. Soc. Lond., 1926, pp. 12.

52. "Narcissus Insect and other Pests." By F. J. Chittenden and G. F. Wilson. JOURNAL 52, pp. 60-65 (1927).

A general account of various pests, especially eelworm attack, upon Narcissi.

53. "The Prevention of Insect Attacks in Gardens." By G. F. Wilson, N.D.H. JOURNAL 52, pp. 235-245 (1927).

A lecture describing the sources of insect attacks and the general methods of combating the attacks.

54. "Investigations into Insecticides for Root Mealy Bug and Root Aphis." By W. H. Saunders. Annals Appl. Biol. 13, p. 495 (1926).

These investigations were partly carried out at Wisley, and had for their object the discovery of a material which could be safely applied to plants to destroy the two insect pests named.

55. "The Use of Nicotine in Horticulture." By G. F. Wilson. Chemist and Druggist, cviii. pp. 423-424 (1928).

56. "Two little-known Pests of Fruit Trees." By G. F. Wilson. Gard. Chron., pp. 417-418 (1928).



FIG. 96.—RHODOLENDRONS, ILEX LATIFOLIA AND MECONOPSIS BETONICAEFOLIA IN THE WILD GARDEN, WISLEY.

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FIG. 97.—SPRING AT WISLEY. *OSMUNDA REGALIS* UNFOLDING, *APONOGETON DISTACHYON* IN FLOWER
IN LONG POND.



FIG. 98.— THE BRIDGE, WISLEY, WITH *WISTARIA FLORIBUNDA*.
APONOGETON DISTACHYON IN FLOWER IN POND.

[To face p. 283.

57. "The Rhododendron White Fly." By G. F. Wilson, N.D.H. JOURNAL 54, pp. 214-217 (1929).

A new pest of Rhododendron, *Dialeurodes chittendenii*, is described, the symptoms produced by its attack are detailed, and methods of dealing with it are given.

58. "*Phagocarpus permundus* as a Pest of Berberis and Cotoneaster Species." Gard. Chron. pp. 409-410 (1929).

59. "Eucalyptus Psylla." By G. F. Wilson. Gard. Chron. (1929).

Deals with a Psylla attacking Eucalypti in English greenhouses.

60. "Report upon Grease-banding Materials, 1923-24." JOURNAL 49, pp. 237-241 (1924).

The reason for and the method of applying grease bands to fruit trees as a means of preventing insect attacks are described and an account is given of experiments made with different kinds of grease, with a report upon the most effective.

61. "Nettle-head of Black Currants: A Review." By F. J. Chittenden. JOURNAL 49, pp. 230-232 (1924).

Observations upon the disease commonly called reversion in Black Currants are recorded, with an examination of diagnostic characters and a definition of the means of distinguishing diseased from healthy bushes.

62. "Some Pests of Waterlilies." By G. F. Wilson. JOURNAL 53, pp. 81-91 (1928).

The insects attacking Waterlilies are described, their ravages illustrated and appropriate methods of dealing with them are set out.

63. "The Beech Coccus at Burnham Beeches." By W. Wilks, H. J. Veitch and F. J. Chittenden. JOURNAL 33, pp. 557-560 (1907).

A report on the condition of the beeches at Burnham, Bucks, then causing the City Corporation great concern, which led to the adoption of measures successful in combating the Beech Coccus and preserving the beeches.

C. POLLINATION OF HARDY FRUITS.

The Director had begun to investigate the setting of apples and pears by the aid of their own pollen in 1902, and the large collections of these fruits at Wisley enabled this work to be extended. At first the trees were too young to yield reliable results by crossing and self-pollinating, for they had not yet got into fruiting habits, but observations were made on the relative time of flowering and the first account dealing with apples appeared in 1911, under the title:

64. "Pollination in Orchards, I." By F. J. Chittenden. JOURNAL 37, pp. 350-361 (1911).

Gives the apples grown at Wisley in their average order of flowering, and points out that little deviation was found in this order during the four years the observations were recorded. The order reported from various parts of England and from abroad was compared and it was concluded that the records compiled in one place, so long as certain conditions were observed, formed a reliable guide for the order of flowering in any other.

65. "Pollination in Orchards, II." By F. J. Chittenden. JOURNAL 39, pp. 368-372 (1913).

Pears, equally requiring cross-pollination, were dealt with in this report, a list in order of flowering from a five years average at Wisley being given, with a comparison so far as was practicable with observations made elsewhere. In general the order of flowering at Wisley was found valid for other districts and countries.

66. "Self-fruitfulness and Self-sterility in Apples." By F. J. Chittenden. JOURNAL 39, pp. 615-628 (1914).

This paper records the results obtained in testing the self-fertility of apples by the bagging method outdoors. Certain apples were shown to be capable of self-pollination and to be self-fertile, but many more failed entirely to set fruit.

One cause of unfruitfulness could not be counteracted in these outdoor experiments, and in order to overcome this difficulty an orchard house from which insects could be entirely excluded was built in 1913, and since then experiments have been conducted in it with comparative immunity from interference by bad weather, since, with the exception of light, other climatic factors are under control. The means taken to exclude insects, too, obviates the need for bagging blossoms and so eliminates any factor that might possibly influence results, and plums were added to the plants under test for self-fertility.

67. "Pollination in Orchards." By F. J. Chittenden. *Annals Appl. Biol.* 1, pp. 37-42 (1914).

A review of the position of knowledge on self-fertility and self-sterility of orchard fruits was made and the cause of self-sterility discussed. Reference is also made to the production of seedless fruits following self-pollination and to the fact that wind plays no part in the distribution of the pollen of apples and pears. The part played by different insects in carrying pollen of apples and pears is also alluded to and the matter suggested for fuller investigation.

68. "Self-fertility and Self-sterility in Plums." By A. N. Rawes. *JOURNAL* 46, 353-356 (1921).

Of the eighteen varieties tested most were found to be self-sterile, and it was shown that even the most self-sterile set more fruit when crossed with other pollen than with their own. These experiments also corroborated Miss Sutton's discovery at the John Innes Horticultural Institution of incompatibility between certain varieties of plums and added one other to the list of those which would not intercross.

A list of order of flowering of plums from an average of eight years is given in this paper.

The continuation of these pollination experiments naturally led to the accumulation of a tremendous number of details, and they are summarized in

69. "Summary of Apple Pollination Investigations." By A. N. Rawes. *JOURNAL* 47, pp. 8-14 (1922).

Of the fifty varieties (including all the widely grown market apples) only eight could be classed as capable of setting a fair crop without crossing, thirty-nine were partially self-fertile but required crossing in order to produce even a moderate crop, and three had failed entirely to set with their own pollen. No instances of inter-sterility had been discovered between varieties of apples, nor did there appear to be ground for thinking that any "pollen preference" existed between varieties.

The order of flowering had been re-examined with figures for thirteen years and its general validity confirmed, and the need for planting varieties with flowering periods overlapping was emphasized.

70. "Pollination in Orchards, VI. Pollen-carrying Agents." By A. N. Rawes and G. F. Wilson. *JOURNAL* 47, pp. 15-17 (1922).

The part played by wind and by insects in pollinating hardy fruits is reviewed and experimental evidence is produced that the wind plays no direct part in pollinating any but nuts.

71. "Pollination in Orchards." By F. J. Chittenden, A. N. Rawes and G. F. Wilson. *Handbook of the Horticultural Section, British Empire Exhibition, Wembley, 1924.*

An exposition of the facts relating to pollination in orchards in England illustrated by an extensive annotated exhibit made in 1924 and 1925 at Wembley.

72. "Sterility in Fruits: a Summary of Twenty Years of Study at the Royal Horticultural Society's Gardens." Being a paper read at the Conference on Sterility in New York in 1926 by F. J. Chittenden. *Rept. of Inter-Conf. on Flowers and Fruit Sterility, New York, 1926*, pp. 79-86.

Methods of experiment and interpretation of results are discussed and a warning given on the unreliability of negative evidence. The paper deals particularly with the pollination of apples and pears. It is concluded that apples and pears are in the main only partially self-fertile; few varieties of apples are entirely self-sterile; no instances of cross incompatibility have come to light in apples or pears; both pollen and ovule degeneration is found in apples and pears and this is possibly related to climatic causes; seedless and partially seedless fruits in apples and pears are discussed.

73. "Pollination in Orchards, VII. Insect Visitors to Fruit Blossoms." By G. F. Wilson. *JOURNAL* 51, pp. 225-251 (1926).

The previous account (No. 70) is expanded and a record is given of observations on insects pollinating hardy fruits with a comparison of their activities in various circumstances, demonstrating the very active part played by the hairy wild bees as well as by the hive bee.

74. "Pollination of Hardy Fruits; Insect Visitors to Fruit Blossoms." By G. F. Wilson. *Annals Appl. Biol.* 16, pp. 602-629 (1929).

A further contribution to a knowledge of the insects concerned in pollinating hardy fruit trees in England, with notes on the bionomics of the insects.

D. EXPERIMENTS ON CULTIVATION AND MANURING.

75. "The Inoculation of Leguminous Crops." By F. J. Chittenden. JOURNAL 34, pp. 231-254 (1908).
76. "The Inoculation of Leguminous Crops (cont.)." By F. J. Chittenden. JOURNAL 34, pp. 491-497 (1909).
77. "The Inoculation of Garden Crops." By F. J. Chittenden. JOURNAL 35, pp. 391-395 (1910).

The discovery of the beneficial association between bacteria and leguminous plants resulting in the production of nodules on the roots of the latter, and bestowing upon them the faculty of obtaining supplies of nitrogen with ease, as well as the beneficial effect of inoculating virgin soil when a new leguminous crop was introduced (as with Soy-beans in North America), led to attempts to obtain increase of ordinary leguminous crops in soils in this country, and statements of phenomenal successes were made. A new form of inoculating material was being widely offered and the Council determined that its value should be ascertained. This series of papers was the result. The experiments were started in 1908 and the first reports are noted above.

It was found that in the Wisley soil which was new to peas no beneficial results of inoculation were obtained with any modification of soil treatment. It was further shown that soils from a great variety of situations contained sufficient bacteria to produce numbers of nodules on the commonly grown legumes of the garden, the main exceptions being soils frequently inundated by the sea.

Claims that non-leguminous crops were also benefited by this inoculation were also tested, but without demonstrating any benefit whatever.

78. "Nodules on Roots of Clematis." By F. J. Chittenden. Gard. Chron. 50, p. 7 (1911).

Reports had been received of the presence of nodules on roots of non-leguminous plants produced after treatment with a culture of nodule bacteria. Root nodules were reported on Clematis and it is shown that they were not produced by bacteria but by the root-knot eelworm, *Heterodera radicola*, and were a sign of disease, not of a beneficial partnership.

79. "Calcium Cyanamide and Nitrate of Lime." By F. J. Chittenden. JOURNAL 36, pp. 610-617 (1911).

The introduction of new nitrogenous manures rendered desirable their comparison with well-tried sources of nitrogen and in 1908 a series of plots was laid down to enable this comparison to be made, and the experiment was continued in 1909 and 1910. The result showed that calcium cyanamide was comparable in its action with sulphate of ammonia and nitrate of lime with nitrate of soda, nitrogen for nitrogen, with the added advantage of the lime in each instance. There were, however, difficulties in sowing both.

80. "Report on Experiments with Bacterized Peat or Humogen." By F. J. Chittenden. JOURNAL 41, pp. 305-325 (1916).

81. "Experiments with Bacterized Peat in 1916." By F. J. Chittenden. JOURNAL 42, pp. 349-352 (1917).

Attempts had been made to treat peat bacteriologically so as to render the materials it contains available for plants. The first series of experiments showed that many samples were of little value and that there was great variation in the samples obtained.

The second series confirmed this, and further showed that there was something in the bacterized peat detrimental to the germination of seeds.

82. "The Effect of Manganese Sulphate on the Yield of Turnips at Wisley." By F. J. Chittenden. JOURNAL 41, pp. 94-96 (1915).

In certain circumstances manganese sulphate increased yield to a slight extent, in others the yield was decreased. The use of sulphate of manganese as a manure could not be generally recommended until further and prolonged investigations had been made.

83. "Experiments on Green Manuring for Light Soils." By H. J. Page. JOURNAL 47, pp. 175-188 (1922).

The value as manure of certain catch crops dug in green is compared and the superiority of scarlet clover (*Trifolium incarnatum*) for this purpose is clearly demonstrated.

84. "On the Influence of Planting Distance on the Yield of Crops." By F. J. Chittenden. JOURNAL 41, pp. 88-93 (1915).

The comparison of the yields of turnips with different exposures—outside row of plants, end plants and so on—mainly of interest to those planning varietal trials and experimental plots.

85. "Potato-planting Experiments." By Messrs. Chittenden, Wilson, Wright and Rogers. JOURNAL 43, pp. 114-129 (1918).

The experiments here recorded dealt with :

- (a) The comparative cropping power of varieties of potato resistant to wart disease.
- (b) The effect on yield of planting out sets, demonstrating that the more extensive the cutting the greater the reduction in the yield of potatoes from individual plants.
- (c) The comparative value of various substances for covering the surfaces of cut potato sets, demonstrating that plaster of Paris was the best.
- (d) Effect of greening potato sets before planting, the results being in favour of greening.
- (e) Effect on yield of number of sprouts on seed set ; the results being in favour of two sprouts.
- (f) Effect of spacing on yield. The results of this experiment showed clearly that the greater the space allowed for each potato plant up to 4½ sq. ft. the greater the yield from a plant, but the greater the number of plants on a given area the higher the yield for the area.
- (g) Effect of time of planting on yield, demonstrating a marked reduction in crop if planting is delayed after mid-May.

86. "Some Further Experiments with Potatoes." By J. Wilson and F. J. Chittenden. JOURNAL 44, pp. 83-88 (1919).

The matter of space afforded to potato plants was further examined, and it is shown that even with the very large area of 4½ sq. ft. the individual plant had not reached the limit of space it could profitably use, but the series confirmed in every respect the results obtained in the earlier series.

A further experiment was made with seed tubers of different origins and demonstrated the value of Irish and Scotch seed potatoes as compared with English and also the value of seed tubers produced at relatively high elevations in isolated districts of England.

87. "The Effect of 'Place' on the Yield of Crops." By F. J. Chittenden. JOURNAL 44, pp. 72-74 (1919).

The influence of exposure to light and soil freedom is demonstrated by results obtained with potatoes, and the proper planning of variety trials is shown to be a matter of great importance, especially where yield is to be calculated.

88. "First Early Potatoes." By F. J. Chittenden and J. Wilson. JOURNAL 46, pp. 351-352 (1921).

Comparisons of the first early wart-resistant varieties are made in continuation of the experiments previously detailed.

89. "Effect of Grass on Apple Trees." By A. N. Rawes and F. J. Chittenden. JOURNAL 45, pp. 116-119 (1920).

The results of a demonstration of four varieties of apples planted in grass and in cultivated land showing that in every variety great growth and more fruit are produced in cultivated land at Wisley than when a circle is left clear round the stem and still more than when grass grows up to the stems.

90. "Comparative Cropping of Apple Trees propagated from Parent Trees of Good History and Bad History." By A. N. Rawes and F. J. Chittenden. JOURNAL 47, pp. 163-168 (1922).

It is shown that the performance of a parent tree is no criterion, *ceteris paribus*, of the performance of trees raised as scions from it. A tree with a bad fruiting history may give trees yielding as well as those propagated from a tree with a good fruiting history, and vice versa.

91. "On the Effect of Length of Daily Period of Illumination upon the Growth of Plants." By M. A. H. Tincker. JOURNAL 54, pp. 354-378 (1929).

A general view of the experiments made for comparing the growth of plants in light exposures of varying length, with particular descriptions of the results obtained at Wisley in 1929.

92. "Some Experiments with Ultra-Violet Ray Glasses." By M. A. H. Tincker. JOURNAL 55, pp. 79-87 (1930).

The crops growing under glass permitting the passage of ultra-violet rays are shown to be little if any better than those grown under ordinary glass, and in some instances are less good and may even be injured.

93. "The Effect of Severe Frosts on Garden Plants in 1908-9." By F. J. Chittenden, with the assistance of several senior students. JOURNAL 36, pp. 358-404 (1910).

This is one of a series of reports in our JOURNAL showing the plants damaged during severe winters presumably through exposure to low temperatures. It was followed about nine years later by another by Mr. Bowles.

E. SOME OTHER EXPERIMENTS AT WISLEY.

94. "The Rogue Wallflower." By F. J. Chittenden. JOURNAL 40, pp. 83-87 (1914).

The curious rogue wallflower is shown to arise from seed of apparently normal plants because a certain number of them are hybrid for this rogue character, the normal form being dominant.

95. "On Double Stocks." By P. J. Jaramillo and F. J. Chittenden. JOURNAL 44, pp. 74-82 (1919).

A comparison is made between the vigorous, medium and weak seedlings of 180 sowings of different varieties of double Stocks. It is shown that in good strains the number of doubles averages 62 per cent., that the percentage of doubles was highest in the plants appearing most vigorous at pricking out time (70 per cent.) and lowest in those weak then (53 per cent.), but there was little difference from the average when the selection of vigorous plants was made at potting time.

96. "The pH Value of Cell Sap of Flowers, I." By B. H. Buxton and F. V. Darbishire. JOURNAL 52, pp. 46-53 (1927).

The comparative acidity and alkalinity of the cell sap of red and blue flowers is reported upon, with an account of the methods used.

97. "The pH Value of Cell Sap of Flowers, II." By B. H. Buxton and F. V. Darbishire. JOURNAL 54, pp. 203-210 (1929).

98. "The pH Value of Cell Sap of Flowers, III." By B. H. Buxton and F. V. Darbishire. JOURNAL 54, pp. 211-213 (1929).

99. "On the Behaviour of Anthocyanins at Varying Hydrogen-ion Concentrations." By B. H. Buxton and F. V. Darbishire. Jour. of Genetics, 21, pp. 71-79.

These three papers continue the account of measurements of the comparative acidity and alkalinity of the cell sap of red and blue flowers and of the inferences to be drawn from the observations.

100. "Hybrids of *Digitalis ambigua* and *Digitalis purpurea*, their Fertility and Cytology." By B. H. Buxton and W. C. F. Newton. Jour. of Genetics, 19, pp. 269-279 (1928).

The characters of the reciprocal hybrids and second generations of these species are described and illustrated from material originating in the garden at Wisley.

The foregoing list of reports on experimental work is by no means exhaustive, but it will serve to show the main lines which have been followed and some of the results obtained.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXVIII.—POLLINATION IN ORCHARDS (IX).

Summary of Investigations on Pear Pollination.

By A. N. RAWES.

THIS report summarizes the results of investigations at Wisley upon the pollination of Pears. In a previous report * the relative time of flowering of varieties of Pears at Wisley has been recorded, and it is there pointed out that self-sterility is a phenomenon at least as common among Pears as it is among Apples. Records were not then available to indicate with certainty whether blossoms of a given variety will set more fruit when one variety furnishes the pollen than when it comes from another, or whether distinctly self-fertile varieties are more fruitful when cross-pollinated than when self-pollinated. Experimental work to determine these and other problems has been continued at Wisley in subsequent years, as facilities have permitted, and the results indicated are outlined in this report. The investigations have been carried out upon trees growing under orchard conditions in the large collection of varieties of Pears near the Meteorological Station at Wisley, and in the Fruit Trials orchards, and with pot trees in the insect-proof Experimental House. One hundred and twenty varieties of Pears, in almost every instance with two trees of a variety, and more than 40,000 flowers have been dealt with in the course of the experiments.

Relative Flowering Time of Pears.—It is generally recognized among fruit-growers that the planting of large areas of a single variety of Pear is to be avoided, and that for best results varieties which approximately coincide or overlap in blossoming should be interplanted. In the previous report * the list of Pears in their relative order of flowering at Wisley is based upon records collected over a period of six years, 1908–1913 inclusive. Observations have been continued annually upon the same trees in subsequent years and the grouping of varieties in Table I summarizes the records obtained over the ten years 1922–1931 inclusive. Comparison with the previous list shows a general similarity in the relative order of flowering of varieties over the two periods, and while there has been an occasional slight deviation from the order, the difference in the average of years (being but a few days

* F. J. CHITTENDEN, "Pollination in Orchards (II): The Flowering of Pears," *R.H.S. Journal*, **39**, p. 366.

earlier or later) has in no instance been sufficiently marked to warrant any important alteration in the grouping there given of varieties which will overlap in blossoming. In an average year 'Brockworth Park' is the variety first in blossom at Wisley, and the present grouping is based upon the average number of days which elapse between the period of full flowering of varieties after the earliest to open.

TABLE I.

*Showing the Order of Flowering of Pears.**Early—one to six days after earliest.*

Belle Guerandaise, Beurré Baltet Père, Beurré d'Anjou, Brockworth Park, Directeur Hardy, Doyenné Bussoch, Doyenné d'Aleçon, Doyenné d'Été, Forelle, Jargonelle, Knight's Monarch, Madame Treyve, Zoé.

Second-early—six to ten days after the earliest.

Aspasie Aucourt, Baronne de Mello, Bergamotte d'Esperen, Bergamotte d'Heimbouurg, Beurré Bachelier, Beurré Clairgeau, Beurré d'Amanlis, Beurré d'Arenberg, Beurré d'Avalon, Beurré de Jonghe, Beurré de l'Assomption, Beurré Diel, Beurré Easter, Beurré Fouqueray, Beurré Giffard, Beurré Hardy, Beurré Superfin, Brown Beurré, Charles Ernest, Chaumontel, Citron des Carmes, Colman d'Été, Comte de Lamy, Conference, Dana's Hovey, Duchesse d'Angoulême, Duchesse de Bordeaux, Durondeau, Fondante de Ceurne, Fondante de Thirriot, Grosse Calebasse, Jersey Gratioli, Madame Millet, Magnate, Maréchal de la Cour, Marguerite Marillat, Marie Benoist, Marquis, Nouvelle Fulvie, Olivier de Serres, Passe Crassane, Petite Marguerite, Princess, St. Luke, Souvenir du Congrès, Summer Beurré d'Arenberg, Thompson's, Triomphe de Jonghe, Van Mons, Van Mons Léon le Clerc, Verulam, White Doyenné, Winter Nélis, Winter Orange.

Mid-Season—ten to fourteen days after earliest.

Autumn Nélis, Beacon, Belle Julie, Bellissime d'Hiver, Beurré Bedford, Beurré Capiaumont, Beurré Dubuisson, Beurré Dumont, Beurré Jean van Geert, Beurré Rance, Beurré Sterckmans, Catillac, Clapp's Favourite, Emile d'Heyst, Fertility, Fondante d'Automne, Gansell's Bergamotte, Hacon's Incomparable, Hessle, Huyshe's Prince Consort, Huyshe's Victoria, Joséphine de Malines, Kelway's King, Laxton's Superb, Le Lectier, Louise Bonne of Jersey, Marie Louise d'Uccle, Nec Plus Meuris, Parrot, Pitmaston Duchess, President Barabé, President d'Osmanville, St. Edmund, Seckle, Triomphe de Vienne, Uvedale's St. Germain, Williams' Bon Chrétien, Zéphirin Grégoire.

Late—fourteen to eighteen days after earliest.

Beurré Bosc, Beurré Mortillet, Dr. Jules Guyot, Doyenné du Comice, General Totleben, Gilogil, Glou Morceau, Grégoire Bourdillon, Jean de Witte, Marie Louise, Michaelmas Nélis, Napoleon, Nouveau Poiteau, Passe Colmar.

The average number of days separating the full flowering of the earliest and latest varieties over the ten-year period under review is eighteen, and the average period over which a variety remains in flower, calculated from records of two trees of a variety, is 18.5 days, as illustrated in the following list of twenty well-known varieties.

TABLE II.

Length of Flowering Period of Twenty Varieties (1922-1931).

<i>Variety.</i>	<i>Days.</i> Average of two trees of each variety.
Émile d'Heyst . . .	15·6
Williams' Bon Chrétien . . .	15·8
Fertility . . .	16·1
Doyenné du Comice . . .	16·1
Marguerite Marillat . . .	16·5
Clapp's Favourite . . .	16·6
Catillac . . .	17·0
Dr. Jules Guyot . . .	17·4
Souvenir du Congrès . . .	17·8
Louise Bonne of Jersey . . .	18·0
Hessle . . .	18·0
Pitmaston Duchess . . .	18·7
Conference . . .	18·7
Beurré Clairgeau . . .	18·9
Durondeau . . .	19·3
Beurré Capiaumont . . .	20·5
Beurré Superfin . . .	21·1
Jargonelle . . .	21·5
Beurré Hardy . . .	21·7
Marie Louise d'Uccle . . .	23·9
Average for all varieties	18·5

It will be noted that the observations do not support the claim sometimes made that 'Williams' Bon Chrétien' normally remains in blossom over a longer period than most other varieties.

With the same twenty varieties, the seasonal variation in the average length of flowering period is shown in Table III.

TABLE III.

Seasonal Variations in Length of Flowering Period.

<i>Year.</i>	<i>Days.</i> Average of twenty varieties.
1922	18·25
1923	20·36
1924	19·00
1925	17·50
1926	22·77
1927	17·21
1928	19·80
1929	17·88
1930	15·23
1931	13·58

An interesting point which the observations emphasize is that the later-flowering varieties remain in blossom over a relatively shorter period than varieties flowering early in the season. The following table compares the average length of flowering period of five early-flowering and five late-flowering varieties over the ten-year period.

TABLE IV.

<i>Early-Flowering Varieties.</i>		<i>Late-Flowering Varieties.</i>	
<i>Variety.</i>	<i>Days. Average length of flowering period.</i>	<i>Variety.</i>	<i>Days. Average length of flowering period.</i>
Brockworth Park .	24.2	Michaelmas Nélis .	19.4
Doyenné d'Alençon .	22.5	General Tottleben .	18.2
Zoé	26.3	Passe Colmar . .	15.1
Beurré d'Anjou . .	26.2	Doyenné de Comice .	16.1
Forelle	25.1	Beurré Mortillet .	18.1
Average	24.9	Average	17.4

In a normal season, therefore, the early-flowering varieties may be expected to remain in blossom for as much as a week longer than those flowering later in the season. The full-flower period of most varieties is reached within seven or eight days of the first flowers opening, and it is to be noted that the early-flowering varieties take, as a rule, a little longer to reach full bloom than do those flowering later. The effective period of blossoming of a variety, for the purpose of interplanting to overlap in flowering with another for effective cross-pollination, might therefore be estimated at roughly ten or eleven days.

Fruit Setting under Normal Orchard Conditions.—For clear understanding of the results obtained and percentages of fruit set when blossoms are hand-pollinated, observations have been made to ascertain the percentage of blossoms setting fruit under normal orchard conditions, when left open to pollination by the insect visitors to the flowers. Counts were made of blossoms on branches distributed evenly over selected trees of several varieties and the number of fruits set and matured recorded. The trees observed were approximately fifteen years old, and their history showed them to be normally healthy and fruitful. They were surrounded by flowering trees of other varieties of Pears, and were selected as well-flowered examples likely to give satisfactory and comparable results. Counts were made some six weeks after full flowering to ascertain the number of fruits set—all unfertilized fruits being shaken off—and a second count made a month later of fruits developing normally. Table V gives the percentage of fruits resulting from the open-pollinated blossoms of ten varieties.

Records of cropping made at the end of the season show that the trees of 'Dana's Hovey,' 'Marie Louise d'Uccle,' 'Souvenir du Congrès' and 'Triomphe de Vienne' carried "light" crops; the varieties 'Williams' Bon Chrétien' and 'Forelle' "good" crops, and 'Citron des Carmes,' 'Émile d'Heyst' and 'Jargonelle' "very good" crops. What constitutes a "good" crop is largely a matter of judgment or guess upon the part of the observer, but these results and other observations made suggest that when under normal orchard conditions 5 per cent. or more of the blossoms on a tree set and mature fruit, cropping might be regarded generally as satisfactory.

TABLE V.

Percentage of Set under Normal Conditions.

Variety.	Date.		
	March 25. Flowers counted.	May 3. 1st count, fruits set.	June 10. 2nd count, fruits maturing.
Citron des Carmes . . .	105	41.0 per cent.	6.6 per cent.
Dana's Hovey . . .	393	2.2 " "	1.5 " "
Émile d'Heyst . . .	526	29.6 " "	9.1 " "
Forelle . . .	123	9.7 " "	4.6 " "
Jargonelle . . .	297	14.4 " "	6.0 " "
Marie Louise d'Uccle . . .	715	12.7 " "	3.7 " "
Pitmaston Duchess . . .	400	19.5 " "	.5 " "
Souvenir du Congrès . . .	486	13.2 " "	2.9 " "
Triomphe de Vienne . . .	268	6.3 " "	1.8 " "
Williams' Bon Chrétien . . .	496	17.5 " "	4.8 " "
	3,809	15.75 per cent.	4.1 per cent.

To determine the self-fertility of varieties experiments were carried out upon pot trees in the Pollination Experiment House and upon trees growing in the orchards. The method adopted with trees in the orchards was to enclose blossom trusses in manila paper bags in the manner described in the similar experiments with Apples.† In the Experimental House all flowers were emasculated before the petals unfolded or the pollen ripened, and pollen of the required variety was transferred carefully to the receptive stigmas. Counts of fruit set and later of fruits maturing were made at intervals of four weeks and nine weeks respectively.

Of the varieties included in the investigations, twenty-two have set well (more than 4 per cent.) when self-pollinated; they are :

Self-fertile.

Bellissime d'Hiver, Bergamotte d'Esperen, Beurré Bachelier, Beurré Bedford, Beurré de Jonghe, Beurré Dumont, Brown Beurré, Conference, Doyenné Bussoch, *Dr. Jules Guyot, Durondeau, Fondante de Ceurne, *Hacon's Incomparable, *Hessle, Marguerite Marillat, Marie Louise, *Marie Louise d'Uccle, Monarch, Nec Plus Meuris, *President d'Osmanville, Uvedale's St. Germain, Williams' Bon Chrétien.

(The most self-fertile varieties, setting more than 20 per cent. of blossoms self-pollinated, are starred thus *.)

Thirteen varieties we regard as partially self-fertile, none having set 4 per cent. of blossom self-pollinated, but all more than 1 per cent. ; they are :

Partially self-fertile.

Aspasie Aucourt, Beurré Jean Van Geert, Beurré Mortillet, Duchesse d'Angoulême, Laxton's Superb, Louise Bonne of Jersey, Magnate, Parrot, Petite Marguerite, Pitmaston Duchess, Van Mons Léon le Clerc, Verulam, White Doyenné.

Twenty-one varieties have set occasional fruits when blossoms were self-pollinated—in no case more than 1 per cent. ; they are :

† F. J. CHITTENDEN, "Pollination in Orchards (III) : Self-fruitfulness and Self-sterility in Apples," *R.H.S. Journal*, 39, p. 615.

Rarely self-fertile.

Belle Guerandaise, Beurré Diel, Beurré d'Amanlis, Beurré Dubuisson, Beurré Superfin, Clapp's Favourite, Comte de Lamy, Doyenné d'Alençon, Émile d'Heyst, Gilgil, Jargonelle, Jean de Witte, Nouvelle Fulvie, Passe Colmar, President Barabé, St. Edmund, Seckle, Souvenir du Congrès, Triomphe de Vienne, Van Mons, Winter Nélis.

The remaining varieties have so far given negative results when self-pollinated. The number of flowers of each self-pollinated is bracketed after each variety.

Varieties that have failed to set fruit when self-pollinated.

Autumn Nélis (165), Baronne de Mello (150), Beacon (165), Belle Julie (147), Bergamotte d'Heimbourg (168), Beurré Baltet Père (62), Beurré Bosc (245), Beurré Clairgeau (144), Beurré d'Anjou (444), Beurré d'Avalon (68), Beurré Fouquerey (168), Beurré Giffard (189), Beurré Hardy (165), Beurré Perran (236), Beurré Rance (62), Catillac (268), Colmar d'Été (184), Dana's Hovey (163), *Doyenné du Comice (776), Fertility (296), General Tottleben (66), Huyshe's Prince Consort (350), Jersey Gratioli (366), Joséphine de Malines (191), Kelway's King (140), King Edward (165), Le Lectier (266), Madame Millet (206), Madame Treyve (189), Maréchal de la Cour (186), Marie Benoist (718), Marquis (177), Michaelmas Nélis (65), Olivier de Serres (182), Passe Crassane (147), Princess (241), St. Luke (217), Summer Beurré d'Arenberg (94), Thompson's (437), Triomphe de Vienne (165), Zéphirin Grégoire (201), Zoé (191).

(* = set one fruit which failed to mature.)

Negative results cannot be regarded as conclusive evidence of self-sterility, as certain of them have been observed over one and two seasons only.

The results obtained with many varieties indicate that the varieties which have set fruits when self-pollinated will set a higher percentage when their blossoms are cross-pollinated than when self-pollinated.

Sufficient evidence is not available to confirm this with all varieties that have set fruit with their own pollen, but the results obtained with certain of them are set out in tables which follow.

In the course of the investigations no clear case of cross-incompatibility among Pears has been observed. Negative results have been obtained with many combinations in one year, but when repeated many have resulted in good fruit-setting. It is interesting to note that in one instance, 'Beurré Bedford' pollinated with pollen of 'Marguerite Marillat,' fruit has been set and developed apparently normally until some seven weeks after the time of pollination, but in three successive seasons the fruits formed have failed to mature, while, on other branches of the same tree, flowers pollinated with pollen of other varieties have matured good fruits. Tests are continuing with the large number of possible combinations of varieties to ascertain the relative efficiency of pollen of one variety in promoting fruitfulness in another. The following tables illustrate the varied results obtained with pollen of different varieties upon blossoms of one tree :

Variety Marguerite Marillat. Percentage of fruit set and matured over three seasons.

658 flowers pollinated with pollen of Marguerite Marillat	set 5 per cent.
60 " " " " " Dr. Jules Guyot	" 22 " "
68 " " " " " Conference	" 7 " "
96 " " " " " Beurré Bedford	" 13 " "
45 " " " " " Doyenné du Comice	" 36 " "
77 " " " " " Durondeau	" 10 " "
35 " " " " " Thompson's	" 37 " "
45 " " " " " Williams' Bon Chrétien	" 41 " "
50 " " " " " Winter Nélis	" 32 " "
35 " " " " " Beurré Superfin	" 50 " "

Variety Beurré Bedford. Year 1929.

Self-pollinated	set 15 per cent.
× Brockworth Park	" 62 " "
× Conference	" 40 " "
× Doyenné du Comice	" 35 " "
× Laxton's Superb	" 71 " "

With several varieties combinations have been repeated over three or more seasons, and those which have resulted in a high percentage of fruits set and matured are as follows :

BEURRÉ PERRAN pollinated with pollen of Louise Bonne of Jersey, Winter Nélis, Dr. Jules Guyot, Conference.

CONFERENCE pollinated with pollen of Dr. Jules Guyot, Marguerite Marillat, Louise Bonne of Jersey, Thompson's, Doyenné du Comice, Beurré Bedford.

DOYENNÉ DU COMICE pollinated with pollen of Beurré Bedford, Winter Nélis, Fertility, Laxton's Superb.

DURONDEAU pollinated with pollen of Conference, Louise Bonne of Jersey, Dr. Jules Guyot, Jargonelle, Winter Nélis, Souvenir du Congrès, Williams' Bon Chrétien, Doyenné du Comice.

ÉMILE D'HEYST pollinated with pollen of Doyenné du Comice, Durondeau, Louise Bonne of Jersey.

JARGONELLE pollinated with pollen of Beurré Superfin, Souvenir du Congrès, Thompson's, Émile d'Heyst.

LOUISE BONNE OF JERSEY pollinated with pollen of Williams' Bon Chrétien, Beurré d'Anjou, Doyenné d'Alençon, Jargonelle, Conference, Émile d'Heyst.

MARIE LOUISE pollinated with pollen of Doyenné du Comice, Durondeau, Williams' Bon Chrétien, Conference.

PITMASTON DUCHESS pollinated with pollen of Doyenné du Comice, Conference, Catillac, Marie Louise.

SOUVENIR DU CONGRÈS pollinated with pollen of Williams' Bon Chrétien, Winter Nélis, Conference, Thompson's, Louise Bonne of Jersey.

WILLIAM'S BON CHRÉTIEN pollinated with pollen of Thompson's, Durondeau, Marie Louise, Conference, Beurré Bedford, Clapp's Favourite.

Special attention is now being directed to the effective cross-pollination of 'Doyenné du Comice' (and other widely grown varieties) on pot trees kindly presented for this purpose by Mr. E. A. BUNYARD.

The results indicate that most varieties of Pears are dependent upon cross-pollination of their blossoms for good fruit setting, and it is plain that varieties flowering at approximately the same time should be planted together in the garden or orchard. In this connexion the usefulness and importance of insect visitors cannot be over-estimated. To demonstrate the part played by wind in transferring pollen from tree to tree, glass slips smeared with glycerine have been suspended during varying weather conditions at varying

heights and distances—3 feet, 9 feet, 12 feet and 20 feet—around the Pear trees whilst in full blossom and the slips examined periodically to ascertain the amount of Pear pollen collected. In all some forty of the slips were suspended near to trees of different varieties, and examination after 20-hour and 30-hour intervals has revealed no Pear pollen grains collected, except in a single instance where a complete Pear flower adhered to the slip, having been dislodged from the tree. It seems clear that insects are the chief agents performing the cross-pollination of flowers, and gardeners and commercial growers who can bring hive bees near to the blossoming trees in spring will greatly assist the effective pollination of the Pear blossom. In a recent paper FOX WILSON * has recorded the number of species of pollinating insects on Pear blossoms, and his observations show that, while hive bees undoubtedly play a most important part, several species of Dipterous insects, more especially Bluebottles and other Muscids, seem partial to Pear blossom and unquestionably are useful pollinating agents. Humble Bees appear to be less attracted to Pears than to other fruit blossoms, and to prefer the faded and withered flowers, at which period, of course, the amount of viable pollen is reduced. When varieties whose flowering periods do not exactly coincide are grown together, however, these late visitors might well transfer pollen from the early blossoming tree, on which flowers are nearly over, to that of a neighbouring tree later in flowering.

The writer acknowledges gratefully the valued practical assistance and continued interest of Mr. F. J. CHITTENDEN, under whose direction the greater part of the work was carried out; of Mr. J. HARDY, of Wisley, in tabulating data; and of senior students in successive years who helped with the recording of blossoming dates.

* G. FOX WILSON, "Pollination in Orchards (VIII): Insect Visitors to Fruit Blossoms," *R.H.S. Journal*, 58, p. 125.

CONTRIBUTIONS FROM THE WISLEY LABORATORY.

LXIX.—ON THE GERMINATION AND THE SEEDLINGS OF GENTIAN.

By F. E. WEISS, F.R.S., Pres.L.S.

THERE is a fairly widespread belief that Gentians are difficult to raise from seed, and it has been suggested by RAMSBOTTOM* that in the Gentianaceae it is probable that a mycorrhizal fungus is necessary for seedling development. This view had already been put forward by STAHL† before the dependence of the seedlings of many Orchidaceae and Ericaceae on a symbiotic fungus had been discovered. But since STAHL had shown the presence of mycorrhizal filaments in the roots of many of the Gentians his want of success in obtaining seedlings led him to the belief that their germination might be dependent upon the presence of the necessary mycorrhizal fungus. In view, therefore, of the suggestions of RAMSBOTTOM and STAHL it seemed of interest to determine whether the germination and the seedlings of Gentians are really dependent upon the presence of a mycorrhizal fungus. As Dr. RAYNER‡ has shown that in *Calluna* the fungus necessary for infecting the seedlings is already present in the seed coat and has recorded the similar presence of the mycorrhizal fungus in the seeds of *Pernettya*§ and *Arbutus*, the seeds of a number of Gentians were examined from that point of view. These were *Gentiana Burseri*, *G. punctata*, *G. lutea*, *G. campestris* and *G. acaulis*. The first three were chosen as possessing comparatively large winged seeds of which it was easy to make microscopic preparations. No trace of fungal hyphae could be detected in the seed coat or any part of the seed. The seeds of *G. Burseri*, which are somewhat flattened, measure about 2 mm. in their larger diameter including the wing. They contain within the abundant endosperm a well-differentiated embryo very different from the small and undifferentiated embryo of the Orchidaceae. There was no indication that this embryo would require the extraneous help of a mycorrhiza for successful development and there was an abundant supply of food material in the endosperm. Two smaller seeds were also examined. *Gentiana campestris* has a small rounded seed, only .7 to .75 mm. in diameter. The embryo is naturally smaller, but possesses distinct cotyledons, and the seed is well supplied with food material. No trace of fungus was seen in either seed or seed coat. As the smooth seed coat is, however, composed of rather

* J. RAMSBOTTOM, "Orchid Mycorrhiza," *Brit. Myco. Soc. Trans.*, 1922, p. 28.† D. STAHL, "Der Sinn. der Mycorrhizenbildung," *Zeitschr. f. wiss. Bot.* xxxiv., 1900.‡ M. C. RAYNER, *Annals of Botany*, xxix., 1915.§ M. C. RAYNER, *New Phytologist*, xxv., 1926.

small cells, the larger seeds of *Gentiana acaulis* were also examined. The oval seed of this species is 1.5 mm. in length by 1 mm. in width. It is almost black, and is marked with irregular grooves and ridges, so that one might imagine that the seed coat had contracted irregularly. In sectional view, however, one can see that the epidermal cells of the ridges are much larger than those lining the grooves. In both the cell lumen can be very clearly seen, and the cells were found devoid of any fungal filaments.

As it was conceivable that the fungus might not be so easily recognized in dry seeds, though the cells of the seed coat were distended when the sections were suitably treated, preparations were also made of the fresh green seeds in ripening capsules of *Gentiana septemfida*, *G. phlogifolia* and *G. lagodechiana*. But neither in the base of the ovary nor in the ovules themselves could fungal filaments be detected.

Since therefore the seeds of the Gentians examined contained no fungus, an infection of the seedlings if necessary for their early development would have to take place from the soil. A number of seedlings which had been successfully germinated at Wisley were therefore examined. Those investigated were: *Gentiana cruciata*, *G. septemfida*, *G. siphonantha*, *G. lutea*, *G. straminea*, *G. Przewalskii*, *G. macrophylla*, *G. phlogifolia*, *G. Walujewi*, *G. Rocheliana*.

Though examined at various stages of development they showed at no stage the presence of fungal filaments either in their main root or their lateral rootlets. A mycorrhiza is therefore not essential for their development.

In certain features, however, the seedlings showed peculiarities which may possibly contribute to the difficulties that some persons have met with in raising Gentians from seed. It is very noticeable how deficient the seedlings are in root-hairs. A tuft of these is always to be found in seedlings at the base of the root where the latter joins the stem, the so-called "collar." Beyond this towards the root apex the root is normally devoid of root-hairs however long the radicle has grown. The same applies to the lateral roots. Only very occasionally and sparsely were a few root-hairs to be observed.

In some of the seedlings of *G. Przewalskii* near the base of the radicle below the main tuft of root-hairs there were found a certain number of root-hairs sometimes forming a second tuft, but the main portion of the radicle and the secondary roots were quite devoid of them. The epidermal cells of the young roots are generally of considerable length, greatly exceeding that of the cortical cells. In sectional view they are seen to be thin walled and soon assume a brownish colour, often becoming disintegrated, the root being then protected by a closely set layer of exodermis cells which are always fairly distinct. The absence of root-hairs is therefore compensated by the delicate nature of the epidermal cells. It should be added that the growth in length of the primary root is rapid and very considerable, and it is desirable to germinate Gentians in comparatively deep pots and not in shallow pans or boxes.

The cortical cells of the young root are loosely set and have considerable intercellular spaces. The cortex is some four or five layers in thickness. The endodermis is clearly marked and already in the primary stage of the rootlet shows a division of its cells into two by new radial walls. Later, as secondary thickening takes place, the endodermal cells divide by further radial walls into five or six cells, thus keeping pace with the increase in thickness of the central cylinder. As this secondary growth proceeds the cortical cells become compressed. By a rupturing of the epidermis the latter, together with the cortical cells, is split off and may often be observed in older roots with the naked eye as a loose skin on the outside of the root. The root is then clothed by the endodermis, in which one can recognize in transverse sections the original radial walls of the initial cells by their greater thickness and shortness as compared with the thinner walls of the later-formed cells. Within this protective endodermis there is a considerable development of parenchyma resulting from the division of the pericycle cells, but in none of the roots examined was any formation of cork cells observed. A cork layer arising from the pericycle is, however, recorded for *Gentiana lutea* and *G. purpurea* by PERROT.*

The parenchymatous pericycle cells in older roots contain a large number of oil drops, a somewhat unusual form of storage material for roots. The endosperm, too, contains oil. No starch was ever observed in the roots of the various species of *Gentiana* examined. In the older roots the secondary phloëm consists largely of parenchymatous cells with small groups of sieve tubes. The secondary xylem is also largely parenchymatous with scattered tracheids and occasional groups of sieve tubes. My observations are in agreement with PERROT's † account of the anatomy of the *Gentianaceae*.

Not only were the primary and secondary roots of the seedlings examined for the presence of mycorrhiza with negative results, as stated above, but the roots of older plants both from my own garden and from Wisley were examined and only in *Gentiana asclepiadea* was an endotrophic mycorrhiza observed. In other species—*G. acaulis*, for example—numerous fungal filaments could be observed running along the outside of the root, but in no case making mycorrhizal connexion.

It is possible that in their natural habitats the roots of *Gentians* more frequently contain endotrophic fungi, but it is evident that such mycorrhizal development is not essential either in the seedling stage or in the mature plant. The alleged difficulty of germination of *Gentian* seeds cannot therefore be due to the absence of a suitable fungus for mycorrhizal purposes.

Another reason for the supposed difficulty of germination has been put forward by KINZEL.‡ This author maintains that no family of plants shows more clearly than that of the *Gentianaceae* the effect of

* E. PERROT, *Annales des Sciences Naturelles*, vii., 1898, p. 105.

† *Ibid.*

‡ W. KINZEL, *Frost und Licht als beeinflussende Kraefte bei der Samenkeimung*, Stuttgart, 1913.

light and frost on the germination of the seeds. According to KINZEL, the seeds of *G. lutea* germinate readily if exposed to a very low temperature, but they will germinate with very little lowering of the temperature if exposed to light. Seeds of *G. punctata* were kept for four years moist in the light without germination, but when subsequently exposed to frost they germinated readily. *G. acaulis* and *G. germanica* germinated after two years when exposed to frost. *G. straminea*, according to KINZEL, requires frost for germinating, and so do *G. nivalis*, *G. septemfida* and *G. Przewalskii*. In his summary on p. 138 he states that the following germinate only in light and frost: *G. ciliata*, *G. brachyphylla*, *G. prostrata*, *G. nivalis*, *G. punctata*, *G. verna*, *G. excisa*, *G. acaulis*, *G. utriculosa*, *G. Pneumonanthe*.

With the object of testing KINZEL's conclusions the seeds of *G. punctata* and *G. Burseri* were exposed in a refrigerator for various periods to the effect of frost and then germinated in both light and darkness in the laboratory. The results did not indicate that either cold or light was helpful for the germination of these seeds.

On the other hand, a large number of seeds of various species of Gentian were handed to Mr. FINDLAY for germination, and without exposure to frost and treated like other seeds they germinated readily and abundantly in one of the pits at Wisley at a temperature of between 45° and 50°.

The names of the seeds which were thus successfully germinated in the ordinary way are given below, but it should be added that the names are those given by the botanical gardens from which the seeds were sent to Wisley, and as the plants have not yet flowered it has not been possible to check these names:

G. affinis, *G. alba*, *G. altaica*, *G. brevidens*, *G. Burseri*, *G. cernua*, *G. crassicaulis*, *G. crinita*, *G. cruciata*, *G. decumbens*, *G. depressa*, *G. Fetisowi*, *G. frigida*, *G. gelida*, *G. Kesselringii*, *G. Kurroo*, *G. lagodechiana*, *G. linearis*, *G. lutea*, *G. macrophylla*, *G. Olivieri*, *G. pannonica*, *G. phlogifolia*, *G. Przewalskii*, *G. Purdomii*, *G. pterocalyx*, *G. punctata*, *G. Rocheliana*, *G. saponaria*, *G. scabra*, *G. septemfida*, *G. siphonantha*, *G. straminea*, *G. tenella*, *G. tianschanica*, *G. tibetica*, *G. Walujewi*.

There would seem, therefore, little difficulty in germinating Gentian seeds under ordinary horticultural conditions, and this is in agreement with the remarks of Mr. C. T. MUSGRAVE* that "Gentians can be easily raised from seed." Mr. MUSGRAVE, however, adds that they may take several months to germinate. This probably refers to raising them in cold frames, in which according to his experience they germinate better than in heat.

I may add that the seeds of various Gentians which were exposed to frost in seed boxes in my garden germinated readily last spring. But as these were not being grown experimentally, and as I had therefore no control series unexposed to frost, I cannot say to what extent the frost may have had a beneficial effect.

* C. T. MUSGRAVE, *R.H.S. Journal*, 57, p. 177 (1932).

In general, my observations lead to the following conclusions :

(1) The presence of a mycorrhizal fungus is not necessary for the germination of the seeds of Gentians nor for the continued healthy growth of the seedlings.

(2) While exposure to frost may be helpful for the germination of the seeds when sown in the open, so that autumn or winter sowing would be advantageous, the experience of Wisley indicates that the seeds of a large number of species of Gentians germinate readily at 45° to 50° and can be successfully established after pricking them out and cultivating them during the summer in frames.

I am indebted to the Council of the R.H.S. for the facilities granted to me in the laboratories at Wisley, and to Dr. M. A. H. TINCKER for help and advice freely given.

FLOWER HUNTING IN CYPRUS.

By Mrs. FRANK TRACEY.

THE chance to find spring flowers in Cyprus eluded me. I was told that in March one sees a glorious display of single Ranunculi—yellow, pink, crimson and white—and other delightful plants and bulbs, but when I landed on April 19 I found many summer flowers were opening which proved very interesting.

In the central plain of the island lies the capital, Nicosia, and outside the city are some curious low hills, separated and truncated in shape, called “kavkallas.” They are said to be topped with remains of the ancient surface of Pliocene conglomerate. The plain seemed to be too well cultivated, and without weeds, so I resolved to walk to one of the hills. The lane from the main road led through the Government Stud Farm, where fine palms and dark-green fields proclaimed good irrigation. Farther on, dry white rocks (of shelly limestone) and stony slopes looked very unpromising, but I soon saw that there were numbers of plants, all with grey leaves and stems, which made them quite unnoticeable at a distance. Loose blue petals lay on the ground near some leaves which might belong to the Geranium family. I hunted all round, but the hot sun had not left one flower with its petals complete. I found some queerly beaked carpels, with a length of seven centimetres, exactly like Dr. Post’s illustration of *Erodium gruinum*, and later the Kew Herbarium confirmed this. All round tufted plants of the charming *Convolvulus cyprius* grew in silvery masses. Mr. R. FARRER wrote of this: “*Convolvulus cyprius* from the lower chinks of Cyprus is a miniature of little *C. lineatus*, with markedly narrow and glistening foliage.”

I do not know *C. lineatus*, but its sister *C. cyprius* was not confined to lower chinks. It grew as freely as heather on open stony ground, along with *Onosma fruticosum*, both kept well shaped by hungry goats. The flowers range from white to deep rose and are smaller than those of *C. Cneorum*. *Onosma fruticosum* is quite unlike all its well-known relations, for it has solitary bright-yellow flowers on wiry erect stems.

Helianthemum ellipticum was a roadside rock rose; the sun had scattered its petals also, but the soft yellow buds were so attractive that I collected seed. *Cistus villosus creticus*, a small blue Echium, and several thistles existed more or less happily on the hillside. At the top of the kavkalla were ruins of an old fort where a forester lived, and whence he could watch the road labourers and country affairs generally. He came to meet us and pointed out the Five Fingers and other peaks in the northern range of mountains. Also he peeled off the fierce

spines of a wild artichoke (*Cynara Cardunculus*) for me to eat the small white heart.

I found that among the loose rocks every plant had a thorn or prickly of different intensity to catch in one's stockings, the only exception being a trailing *Convolvulus*, with large pale pink flowers ringed with crimson. It garlanded the stone ledges and escarpments of the hill-top and was identified as *Convolvulus althaeoides*.

To the south-west rose the Troodos range of mountains, the highest in the island, and snow could still be seen on the highest part, but the road was reported to be open and I hoped to climb it (in a car) very shortly.

In comparison with other Mediterranean islands, Cyprus seems bare of vegetation, except in the high forests. Agricultural development, Government irrigation, and forestry work are changing the general aspect of the country for the better, in spite of the fact that most of the streams dry up in the summer. In the Middle Ages the fleets of the surrounding nations used to depend on Cyprus for their timber, and when England took over the island in 1878 the forests were in a ruined state. The flora must have suffered in consequence, and many plants are now very restricted in locality, as well as damaged by goats, whose wanderings have now been curtailed in certain districts, by decree. In the few places in which I stayed the plants seemed very distinct in each. I looked for some days for *Lavandula Stoechas*, which I recollected as plentiful in Crete. At last I was told that it had one habitat, far off in the hills, and there it was indeed, a very fine variety with immense violet beards, covering some acres almost exclusively.

The Norwegian botanist, Mr. HOLMBOE, says that "The amount of endemical plants on the island is considerable—69 species and 14 subspecies. It seems most natural to presume that the majority of the spontaneous plants have immigrated during the period when the island was connected with the continent, in the north and east, for there is great correspondence between the flora of Cyprus, Syria, Asia Minor and Greece."

He believes, also, that when the climate became drier the moisture-loving plants were pushed back to river banks and shady valley clefts. I heard of *Cyclamens* which covered the ground with blossom in March, but it took nearly three weeks' search to find them hidden in shady corners under great rocks. Of course, the leaves had disappeared, but there were ripe seeds on corkscrew stems. I had an equally difficult search for roots of the spring *Ranunculus*, but a few seedling plants were found on a hillside where there was a little moisture and they gave me fine lemon flowers in England.

On April 25 we started on our drive to Mount Troodos, by a road leading across the plains west of Nicosia. By careful cultivation much of the grey scrub and loose stone have given way to corn, flax and vines. Yellow pools of colour were made by annual marigolds among the green crops.



FIG. 99.—HILLS BEHIND AKANTHON, CYPRUS.

[To face p. 302.



FIG. 100.—*ORNITHOGALUM CHIONOPHILUM*.

At last we turned south, past copper-mining débris, into a winding valley, where deciduous trees and tall crimson *Gladiolus* (probably *Gladiolus segetum*) heralded a more cheerful vegetation. Creamy buds hung unopened on the first bushes of *Styrax officinalis*, neighbouring a little stream, and most comical tufts of *Muscari comosum* pushed out of a stone wall. The green banks of this valley of Evrykhou hold the secret of *Cyclamen cypricum*, an autumn-flowering rarity.

Sharp mounting turns of the road brought us into a belt of *Arbutus*, at about 2000 feet, and I recollected Mr. HOLMBOE's note that a Russian pilgrim, ZOSIMOS, wandering round Cyprus in the fifteenth century, made a special record of *Arbutus Andrachne*. Such a bald statement leaves one guessing at the rest of his tastes and travel diary.

I shared his admiration for *Andrachne*'s vivid red stems thrown out at strong angles from the mountain-side and silhouetted against a cerulean sky. Shining green leaves and creamy buds were less arresting than the tones and variety of glowing copper and carmine branches.

At last the car stopped, and I could explore a grassy terrace shaded by tall trees and bushes and cheered with running water. By the stream rose strong grey-green shoots and leaves of *Paeonia corallina*, and ferns and Herb-Robert led me away to trails of a charming blue and white *Viola sylvestris*. Other small plants promised a speedy flowering, but only blue and red *Lathyrus* were open. Farther up the hill I found the handsome Anatolian Orchis, with loose spikes of fine pink or white flowers, and on the driest banks grew an imposing white *Astragalus lusitanicus*. Yellow mats of *Alyssum campestre* were so attractive that I looked for seed, but it had not formed and the plants did not survive the journey. *Thymbra spicata* would also be a desirable novelty. NICHOLSON calls it "A rockwork plant, 6 to 12 inches, with the habit of a *Thymus*; it thrives in sandy loam and requires protection in winter." I only saw it once, and the cushions of rosy pink flowers with a pleasant scent were most attractive.

We drove on past the asbestos mines, where engineers have cut up deep gorges and spanned them with cable railways, through Government forests of Aleppo pines, cedars and curious oaks, and finally stopped the car at the settlement of Troodos, about 5,500 feet. Rows of tin huts stood empty and desolate, half-melted snow lay on the roadside, and the bare earth was soaking in the thaw. No visitors would arrive for two months, but already flowers were in blossom. Miniature spikes of pink fingers with rue-like leaves were certainly a *Corydalis*; some of the flowers were pure white, and the pink shades varied to a rose colour. With much difficulty we dug out fat little tubers at the end of long stems. These stems are a "biological curiosity," according to Mr. HOLMBOE, as "the underground part is thickly covered with hairs, while the overground part is quite smooth."

I was delighted to find three rare plants together, for alongside of *Corydalis rutaefolia* grew a dwarf *Ornithogalum chionophilum* (fig. 100),

and *Ranunculus cadmicus* var. *cyprius*, with very metallic yellow flowers and curious dark leaves. The first two have flowered well in England.

Mr. R. FARRER wrote: "*Corydalis rutaefolia*, from beside the melting snows of Anatolia, ferny fat lobed leaves—one or two springing from a bulb which is solid, the spike runs some six inches bearing large flowers of a pleasant pink."

We walked about the hillside near the Governor's residence, but saw no more plants in bloom. *Cephalanthera rubra* is reported in this district, and a rare *Pinguicula*. We were urged to start again soon on the drive down the southern slopes, as the sharp double turns cannot be hurried over. At about 2,000 feet below we found the village of Saïttá, set in a green valley and boasting a spacious bungalow hotel. Elaborate flower beds and fountains of water were being laid out and planted as the height of luxury. The slopes above the house were covered with bushes and plants; *Cistus* in variety and a strongly scented *Salvia cypria* with deep-blue flowers grew luxuriantly among *Anchusa* (3 feet high) and dark-brown *Scutellaria*. Very queer bright rose coloured knobs pushed through the soil, in the shade of some *Cistus*, and we looked for more to see how they would develop. Several were unfolding brilliant wax-like scales which formed the calices of stiff yellow blossoms. This parasitic plant, *Cytinus hypocistis*, grows in various parts of the world, but in the Mediterranean it quarters itself on *Cistus* roots. An astringent acid is produced from it and is used by southern races as a cure for dysentery.

On the same slopes I found a scattered regiment of miniature *Gladiolus* coming into bloom. The flower was of a soft pink, sometimes tinged with copper, and Kew has named it *G. triphyllus*. It is reported generally from the south-west side of Cyprus.

Styrax officinalis was in full beauty of flower round Saïttá, among thickets of bay and oleander, and I was sorry to leave this garden valley for a long drive to the southern coast. We saw many interesting places *en route*, but few new flowers. The great mass of Troodos, igneous rocks and strongly-coloured earth, gave way to limestone and less varied vegetation. In one hill valley of vineyards, wild roses were flowering in the hedges and bunches of the old pink Damask rose were given to me.

At about 1,200 feet a swampy meadow was gay with a mass of tall purple *Orchis laxiflora*, *Linum usitatissimum* of palest blue and the handsome *Ornithogalum narbonense*, with *O. umbellatum* on the drier side of the field.

As we came down the last descent to the corn- and carob-planted coast plain, we had a wonderful view of the Lebanon snowfields many miles to the east, across the sea.

My next flowers came from the northern coast of Cyprus, round Kyrenia, which had a distinct dwarf flora. The plants were tightly compacted and wedged into the sharp stone ledges and faulting of the rocks which rose in a straight slope from the sea-shore. There were tiny plants of *Statice*, a violet-blue variety, purple *Allium*, *Echium*

diffusum with minute hoary leaves and gentian-blue flowers, the palest pink *Silene*, grey and golden masses of *Helichrysum rupicolum* var. *brachyphyllum*, grey-leaved *Anthemis tricolor* (pink and white), whose third colour always evaded me, and an incredible mat of wire, the prickly armour of *Sanguisorba spinosa*. This plant has been used in Crete from time immemorial as a filter in the women's water-jars, according to Mr. TREVOR BATTYE. For a change I found a soft-leaved plant with a very sweet scent and 8-inch spikes of rosy red. This was *Teucrium divaricatum*.

At intervals very small streams have carved quite large channels to the sea, and in these hollows might be seen strong green clumps of Myrtle, whose flowers opened in the second week of May. Once I found a gorgeous mass of *Lonicera etrusca* covering a bank with its rosy buds and pale-yellow blooms. *Acanthus* and *Rue* grew above a sedgy stream, where we watched a water bird, perhaps a Sandpiper, enjoying the soft mud, and farther up the same water we had a wonderful sight of seven or eight Bee-eaters, blue-backed and crimson-breasted, who swung in long curving flight up and down the rocky bank.

Inland there were gay roadside flowers of strong crimson and blue *Echium*, a stiff yellow composite like an *Inula*, but called *Pallenis*, and ivory-white *Scabiosa prolifera* (annual) which has stood some frost in England. Near a mule path, through olive trees, I found a sweet-scented *Orchis coriophora* of brownish pink, *O. sancta* of lovely rose and some of the Bee and Fly family, on drier slopes. *Clematis cirrhosa* and *Smilax* preferred the shade of thickets; *Cynoglossum pictum* had pretty flowers of pale blue pencilled with darker lines, and other less attractive flowers included blue *Convolvulus*, two white *Alliums*, a lavender *Orobanche*, and two *Nigellas*. On the first of May one village had wreaths of *Statice* over every door, which must have been brought from the sea coast, a couple of miles away.

There was a reported habitat of *Anemone blanda* on a high pass in the hills, but it was too late in the year to look for it. In the ruins of the Castle of St. Hilarion I found some of the interesting plants which Mr. HOLMBOE had reported from there. At some time in the fifth century an anchorite, Hilarion, made his cell on a rock about three thousand feet up in the northern range. He was drawn to these parts by his friendship for St. Jerome, who lived in Palestine. After Hilarion's death a monastery grew up on the same spot, and later still the Lusignan kings of Cyprus recognized the amazingly impregnable situation and built a royal castle about A.D. 1225. The fortifications still exist and their circuit is over a quarter of a mile. The ruins of the palace, where a boy king took refuge when Cyprus was attacked, lie in a fork between two peaks, and some beautiful detail of carving still remains. Even to-day it is a most marvellous place, set above a sheer drop of hundreds of feet to the coastal plain dotted with villages and leading on to the sea, which in midday light melts into haze, but in early morning carries one straight to the snow-capped mountains of Asia Minor. The most distinguished flower in the castle

was an incredible one, *Brassica Hilarionis*. Its spike of fine white blossom had a dignity and ivory quality of texture, which was set off by pretty mauve calices and curved grey-green leaves. Golden *Phlomis cypria* had firmly rooted itself on a dizzy ledge of cracked masonry outside the half-domed chapel, and the stone staircase below was whitened with a drift of petals from *Styrax officinalis*. In a quiet doorway was a little poppy of strawberry pink (*Papaver gracilis*), and broad Iris leaves grew above my head on the palace walls. I think they were of Pallida type. The castle was not a sad place as some ruins are; the plants seemed happy there and the Government forester spoke of the place as if he loved to care for it. Soft buds and yellow flowers were uncurling on *Onosma caespitosum*, which grew in diagonal rifts across a great rock, and aromatic *Micromeria* masqueraded as a pink Thyme in the Queen's Parlour. Long shoots of hop-scented *Sideritis cypria* were opening softly pilose green bracts; this plant and its relations are valued for healing round the Mediterranean.

As, most reluctantly, we left the castle, the forester offered me the ball-shaped fruit of a small plant. It was that ancient magical herb, Mandrake. My hands were full of flowers and it went into a pocket. The suave mysterious scent accompanied me down the slopes of Cistus and tufted *Lithospermum hispidulum* to the zigzag road, where twentieth-century life began again.

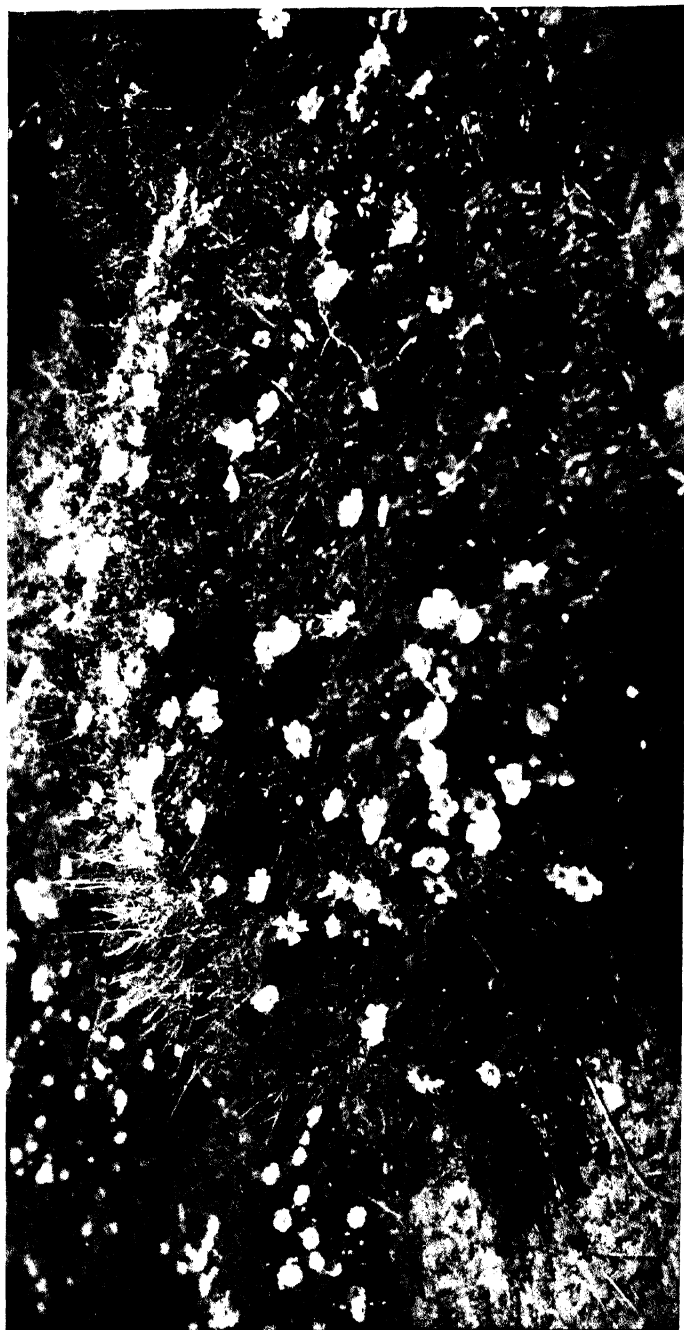


FIG. 101.—*CISTUS CYPRUS* ON THE ROAD NEAR POLIS, CYPRUS.



FIG. 102.—THE KARPAS, CYPRUS. DESTRUCTION OF VEGETATION BY GOATS.



FIG. 103.—ERINACEA FUNGUS ABOVE MINAS DE BEIRAS.



FIG. 104.—BARRANCO OHANES. TRACK CROSSING RIO OHANES.

FURTHER NOTES ON PLANTS SEEN IN THE SIERRA NEVADA OF SPAIN.

By T. ASHTON LOFTHOUSE.

TOWARDS the end of June, after visiting the Sierra Nevada mountains from Granada, the journey was made to the opposite (eastern) end of the range.

The motor *correos* was taken from Granada to Lanjaron, where the first night was spent. *Capparis spinosa* and *Spartium junceum* were noticeably pretty in places *en route*, but most of the plants on the lower slopes of the mountains by the road were burnt up at this time.

In a short stroll in the evening plants seen included *Thalictrum Albinii*—a tall yellow-flowered *Thalictrum* near *T. glaucum*, which we found had only recently been described as a new species—*Lathyrus clymenus*, *Silene glaucum*, and the pretty-leaved *Lavandula multifida*.

Leaving Lanjaron by *correos* at 9.30 the following morning, we arrived at Berja at 4 o'clock in the afternoon. Berja is situated in a hot position on the western slopes of the Sierra de Gador. It is an important grape-growing centre, in the area in which the Almeria grapes, so well known in English markets, are grown.

On the following morning a few hours were spent on the slopes of the Sierra de Gador. Interesting plants seen were *Lafuentia rotundifolia*, an uncommon plant related to the Foxglove, with short spikes of small Foxglove-like flowers; *Helianthemum rubellum*, *H. lavandulifolium*, a beautiful Sun Rose, with silky grey foliage and bright yellow flowers; a small-flowered form of *Convolvulus tricolor*, which appears to be *C. meonanthus*, with blue and white flowers; *Fumana Spachii*, a dwarf, shrubby plant covered with its bright yellow flowers in the hot sun; *Cistus Clusii* var. *viridis*, *Lavandula multifida*, *Campanula Erinus*, dwarf, with woolly leaves and bright blue flowers, found in rock crevices, *Linum corymbosum* with yellow flowers, *Plantago albicans*, *Galium ephedrioides*, *Centaurea aspera*, and *Satureia obovata*.

In the afternoon a local motor service took us by a lumpy and rough road to Laujar, an out-of-the-way and somewhat dilapidated place, which from the type of its buildings had evidently been of considerable importance in earlier times. In the inn at Laujar a somewhat disturbed night was spent, and we were met in the early morning by Augustin (a native, who later accompanied and acted as guide on our expeditions into the Sierras) with mules to convey us to comfortable quarters with the engineer at his bungalow at the Minas de Beires, situated at the eastern extremity of the Sierra Nevada at an altitude of about 5,000 feet.

MINAS DE BEIRES.

The bungalow is situated on a schistose outcrop on the outskirts of extensive ironstone mines, ore from which at times finds its way to the ironworks of Middlesbrough, whence I started. It is perched up in a prominent position, the ground falling steeply to the valleys below, with delightful views in all directions to the south and east. In the foreground are the valleys, and beyond the Sierra de Gador and Sierra Alhamilla, apparently burnt-up stony wastes, but at close quarters having many interesting flowers, especially in the winter and spring months.

In the bungalow garden enclosure, only partly cleared, flourished the dwarf, grey, hard-leaved *Dianthus brachyanthus*, with pretty rosy-pink flowers; *Linum suffruticosum*, a white flax, particularly lovely when fully opened out in the bright sunshine, and showing a dark eye due to the purple shading at the base of the petals; small bushes of *Helianthemum pulverulentum*, smothered with both white- and rose-coloured flowers; *Anthyllis Webbiana* with woolly, silvery-grey leaves and dark, sometimes bright red, flowers—this raised from seed did quite well for a time in my garden, the leaves, however, were not nearly so grey: owing to its attraction to slugs it prospers no longer; and *Helichrysum serotinum* with shrubby grey-scented leaves and yellow flowers lives through our winter in England.

Acres of *Erinacea pungens* (fig. 103) were growing on stony ground above and below the bungalow, from about 4,500 to 6,000 feet, including sparingly white-flowered plants and occasionally flowers of a brighter blue than the usual purplish-blue. At the mine's level young *Erinacea* plants were deeply rooted in the levelled stony refuse from the ironstone workings, also seedlings of the spitefully spiny yellow-flowered *Genista Boissieri*. *Phlomis crinita* and *P. Lychnitis*, and hybrids between the two species with woolly grey leaves and whorled heads of bright yellow flowers, were a feature on the natural ground and near the tracks above. They would be delightful garden flowers if our climatic conditions were only suitable. *Phlomis purpurea*, with grey leaves and whorls of purple flowers, was less plentiful. *Artemisia glutinosa*, with deep green foliage, was a noticeable weed, badly infested with "galls" and at times with the parasitic *Orobanche cernua*, with beautiful azure blue-flowered spikes. A giant thistle, *Onopordon acaule*, was locally outstanding with its large basal rosette surrounded with smaller rosettes in a similar way to *Semprevivum montanum*, with sturdy flower-spikes 4 to 6 feet high.

In the valley below the bungalow, *Microlonchus Clusii* with pale mauve daisy flowers was seen, and *Ulex australis*, a gorse that grows in hot positions in many parts of Spain. Wandering in this area towards the end of our visit it was pleasing to see the stony bare ground studded with the white and pink flowers of *Erythraea pulchella*: multitudes opened out star-like in the bright sunlight.

Above the mines on schistose outcrops *Teucrium compactum*, with purply-green foliage which became grey-green in my garden, and *T. granatense*, with grey-green leaves and white flowers, both dwarf compact plants rooted into the crevices, as did also the lovely *Thymus membranaceus* with its greenish-grey hard foliage and beautiful flower-heads, good-sized cone-shaped pinkish bracts, from between which the white flowers are projected: it was very local, and only seen sparingly in this and one or two localities at no great distance away and not seen at the Granada end of the range. This Thyme has flowered well in my garden, and when shown at Vincent Square it received an Award of Merit. Other Thymes included *Thymus Zygis*, plentiful, almost like a dwarf, white-flowered heath, delightfully scented, *T. Mastichina* and *T. hyemalis*. The white-flowered thymes are known to the natives as *Tomillo blanco*. *Astragalus Bourgeanus*, *Leuzea conifera*, with peculiar cone-shaped flower-heads, and *Aethionema ovalifolium* were noticed in cultivated stony ground.

A *Linaria* that seems to be *Linaria nevadensis* was particularly noticeable near the tracks leading to the mines, with glaucous-grey foliage and usually deep mahogany-red velvety flowers, sometimes deep purple. It is a delightful plant in the garden, but difficult to keep if any *L. supina* is near.

A short distance to the west of the mines there was cultivated land in the valleys, very stony and dry. The crops are mostly leguminous, "chick peas," etc., the corn that was grown being very short-stemmed and sparsely distributed. In this area an association of white-flowered *Armeria allioides* with narrow-leaved rosettes and white flowers on 6- to 9-inch pendulous stems, and *Onobrychis argentea* with silvery-grey leaves and reddish-purple flowers, was particularly effective. A mass of *Vicia dasycarpa* with deep blue flower racemes was showy on a bank side, more so even than the better-known *V. onobrychioides*. *Anchusa granatensis* is an interesting weed with rough greyish leaves and dark blue-black flowers, but grown in the garden the leaves were greener and the flowers dark blue, and not comparable in beauty with some of the garden *Anchusas*. Other striking plants included *Onosma echiioides*, *Myosotis alpestris*, *Senecio minutus*, a pretty weed in cultivated ground, and *Globularia echinata*, with lavender-blue flowers.

Farther to the south-west on the high parts towards Laujar plants of interest were *Moehringia intricata*, with glaucous-green rounded leaves and dainty white flowers, small plants tucked into sunless crevices; *Galium pruinsum*, with hard silvery-grey leaves and white flowers; *Campanula Loeftlingii* var. *occidentalis*, a lovely dwarf *Campanula* with *C. patula*-like flowers and greyish foliage; *Telephium Imperata*, *Sarcocapnos boetica*, small plants tucked into crevices on the underside of projecting rocks, with small glaucous-green rounded leaves and dainty *Corydalis*-like flower-spikes; the yellow-flowered, dwarf compact *Draba hispanica*, *Alyssum longicaule*, *Polygala rupestris*, *Thymus membranaceus* exceptionally fine, and *T. hirtus* var. *erianthis*.

BARRANCO OHANES.

The Barranco Ohanes is a beautiful steep gorge, merely a broad crack in places, along the bottom of which runs the Rio Ohanes, a tributary of the Andarax, the river which takes most of the drainage from the eastern portion of the Sierra Nevada and adjacent Sierras.

The track (fig. 104) from the Minas de Beires to Dona Maria crosses the valley at about 3,000 feet altitude, and the river rises at about 7,000 feet.

There is a good deal of Evergreen Oak scrub in the lower part of the valley. Two leguminous shrubs growing out of the sides of the Barranco were particularly attractive, *Adenocarpus decorticans*, 6 to 10 feet high, with reddish, variegated woody stems and branches and deep yellow flowers in short stiff racemes at the ends—Mr. BEAN speaks well of this shrub in his book on Hardy Shrubs, and instances it as doing particularly well near Haslemere,—and *Genista florida*, a Broom 6 to 10 feet high with long racemes of yellow, pendulous flowers very freely produced, somewhat similar to the Retamas. *G. florida* is an outstanding species in a large and generally attractive group.

Lonicera splendida, of which odd specimens were noticed, is a good shrubby climber, with prominent oval glaucous-grey leaves and large reddish-yellow flower-heads, one of the best of this genus for the garden, and according to WILLKOMM'S Flora, a native of the Sierra Nevada and Murcia only. *Lonicera hispanica* and *Daphne oleoides* were other shrubs seen.

Interesting plants included *Digitalis nevadensis*, not unlike our native Foxglove; *D. obscura*, a Foxglove with ferruginous red flowers; and *Aquilegia nevadensis*, the Alpine Aquilegia of this region, with purplish-blue flowers. Growing out of the rocky crevices were *Moricanda Ramburei*, a red-flowered plant of the cabbage family, with greyish leaves; *Centranthus nevadensis*, an attractive dwarf Valerian, with narrow, pale red flower-spikes thrown out from its rosettes tucked in rocky crevices, quite a good garden plant, which is figured in WILLKOMM'S Illustrations; and *Dianthus lusitanicus* with clustered red flowers on 12-inch stems.

Plants alongside the track near the crossing of the stream were *Linaria verticillata*, a pretty yellow dwarf Snapdragon; a dwarf form of *Campanula Loeftlingii*; and an interesting Dock, *Rumex induratus*, with greyish-green stems and leaves, growing into bushes about 2 feet high which is especially attractive when covered with its bright crimson seeds. Being a *Rumex* it is easy to grow, and in my garden it is an effective bushy plant.

In open spaces alongside the stream to the east of the track were the pale yellow-flowered *Aconitum ranunculifolium*, *Anagallis coerulea*, *A. tenella*, pleasant to see so far from home, happy in boggy positions, the flowers seeming to be a deeper red, *Orchis Durandii*, and *Lythrum acutangulum*, a dwarf red-flowered Loosestrife.

A little way along the stream above the track to the west a *Primula*



FIG. 105.— NORTH SLOPES ABOUT 7,000 FEET TOWARDS ALMIREZ.

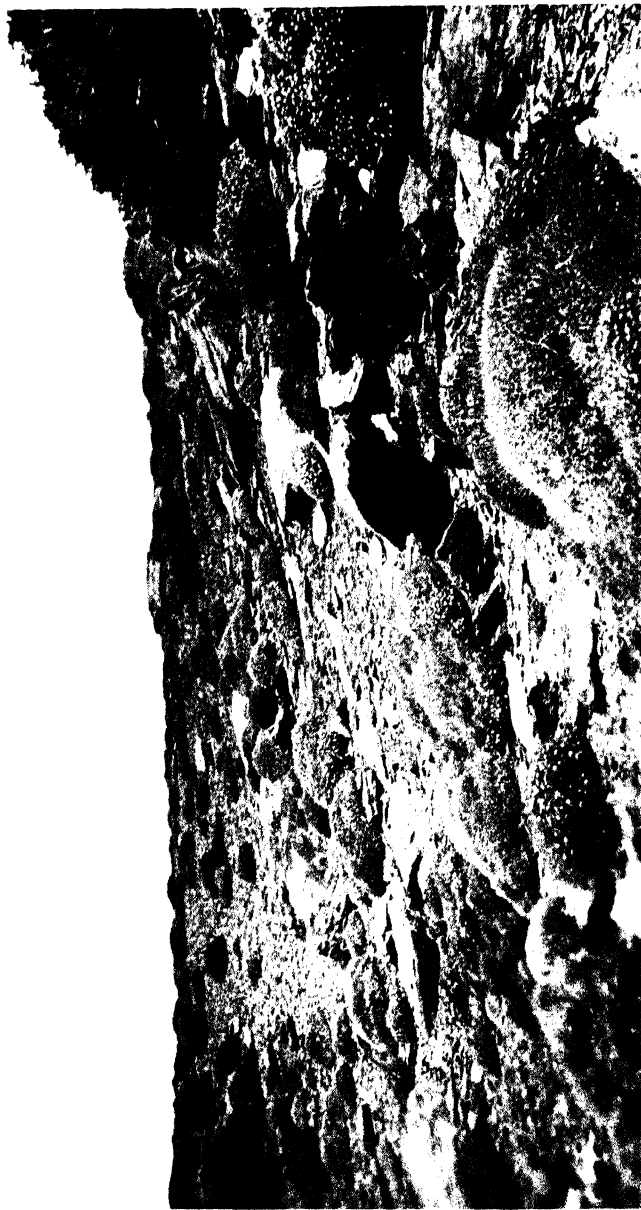


FIG. 106.—ALYSUM SPINOSUM, ETC., NEAR CERRO DE RAYO.

To face p. 311.

of the Vernaes section was found that proved to be new, and has been described since and named *Primula Lofthousei*. It was raised from collected seed. Its flowers are deeper and brighter yellow than any of the *Primulas* of the *Elatior* group that I have, and it flowers later. Higher up in wet positions *Pinguicula grandiflora* was lovely, the deep purplish-blue flowers being unusually large. In WILLKOMM and LANGE'S *Flora of Spain*, the only previous records for *P. grandiflora* were in the north of Spain.

Matthiola tristis was on the higher slopes above the Barranco, along with *AsterocarpusCLUSII* var. *prostrata*, a dwarf mignonette-like plant, its narrow flower-spikes being projected out of a basal rosette.

High up near the source, at about 7,000 feet altitude, *Senecio Tournefortii* var. *nevadensis* was growing in damp positions near the stream, dwarfer and more compact than plants of this species seen in the Pyrenees in the previous year. The yellow-flowered *Potentilla nevadensis* was here, and the Lily-like flowers of *Anthericum baeticum*, somewhat different in growth from the plants seen at the Granada end of the Sierra Nevada.

CERRO DE RAYO.

On Cerro de Rayo, about 7,000 feet, and C. de Almirez, 7,500 to 8,000 feet, many interesting alpine plants were growing. On these high-up, open, stony localities, the plants are more frequent and interesting on the northern slopes and on the north side of rocky ledges (fig. 105).

Most of the snow had disappeared, although small patches in hollows facing north were occasionally seen.

Plants were patchy on the tops and usually generously surrounded with shaly screes. The "island" plants of the exposed tops included *Alyssum spinosum* (fig. 106), very beautiful, and mostly with rose and deep rose-coloured flowers; *Arenaria pungens*, large, grey, fiercely prickly mounds covered with good-sized white flowers, an interesting and choice plant; *Astragalus nevadensis*, another super-prickly shrubby mound; and *Genista boetica*, not nearly so spiny as *G. Boissieri* at a lower level. Plants that have no such protection flourish under the shelter of these prickly mounds, which not only protect them from the hot sun but also from the herds of goats that are brought up to the heights in the summer, which clear off the plants in the open very effectively. Plants growing in this region and taking advantage of sheltering under the prickly mounds include *Viola nevadensis* (*crassiuscula*), the Sierra Nevada alpine *Viola*, mostly with white or bluish-white flowers, not so blue as some seen in the Granada area, and *Erysimum violaceum*, a vivid deep magenta-flowered Wallflower, not included in my copy of WILLKOMM'S *Flora of Spain*. Its flowers were dazzling and dominated and almost completely killed their quieter-coloured neighbours, such as the pretty yellow-flowered *Douglasia Vitaliana*, with its grey mounds frequent in the open, but flowering much more freely in the shelter of the prickly "islands." *Chaenarrhinum macropodium* was also here perfectly lovely, with large flowers

of rich violet-blue and glaucous-grey foliage—a gem, but possibly difficult to keep through the usual English winter.

In the crevices of an outcropping rocky ridge *Androsace argentea* was magnificent; its hard silvery-grey little mounds surmounted with charming white flowers were tightly wedged into the rock crevices, usually on the underside, with protection from overhead wet and hot sun.

At or near the base of these rocks were the only Saxifrages seen at this end of the Sierra Nevada: *Saxifraga nevadensis*, a compact green mossy plant with white pink-spotted petals and occasionally pink petals, and *S. glaucescens*, a dwarf *S. granulata* form with white flowers and grey leaves. A *Sempervivum*, the only one seen on the range, was here. This has beautiful bright red flowers and flourishes in my garden.

On the northern slopes, a little below, a beautiful Composite was collected which had large deep blue daisy flowers about 6 inches high. This proved to be an addition to the Spanish Flora, and is described by A. J. WILMOTT (who was my companion on this visit) in the Journal of Botany, under the name of *Lactuca singularis*. *Astragalus incurvus* in the screes had pretty silvery-grey mounds and purplish-blue flowers.

More in the open was *Armeria splendens*, the Sierra Nevada representative of the *A. caespitosa* group, a little larger than the latter, with bright red flowers on short stems clear of the plant, and occasionally white flowers. This is a good dwarf Alpine, and it did well in my garden for a time, but unfortunately damped off in a particularly trying winter. This has been collected recently by a friend in the Sierra de Gredos, the highest mountain range in Central Spain. *Ranunculus demissus* var. *nevadensis*, a form of large-flowered buttercup, was in this area. It is a plant that has a wide range in the high alpine regions of Greece, Asia Minor, and Persia.

Springs are few and far between in these high-up, open, dry areas, and only known to the few natives that have occasion to traverse them. Augustin, our native guide, led us to one on the northern slope of the mountain, where a halt was made for lunch, a lovely green basin with a copious spring and a plant oasis in which were many good plants that had only been seen sparingly, and some additions to those already collected. The only Gentian seen in the eastern part of the range was here, *Gentiana aestivalis*, delightful, with its large *G. vernalis*-like flowers, lovely blue stars in a deep green setting. Associates included *Viola nevadensis* in plenty, and *Ranunculus acetosellaefolius*, an outstanding high alpine *Ranunculus* with grey “sheep’s sorrel”-like foliage and large snow-white flowers. This I had for some time in my moraine but unfortunately the slugs never left it alone, and eventually, owing to their persistence, it was lost. A friend in the North still has it, and it flowers beautifully. *Gagea polymorpha*, with yellow flowers, was also in the basin. Bulbs of *Crocus* out of flower proved to be *C. granatensis*, a close relative of *C. nudiflorus*, a *Crocus* that

inhabits the high parts in Northern Spain. *C. granatensis* is found in a restricted area in the Sierra Nevada and North Africa. This *Crocus* has flowered with me very sparingly, and seems to spend most of its energy in running about in the open outside frame that it is planted in. [Bulbs of *Crocus nevadensis* were also collected in another locality. This is also confined to the Sierra Nevada and adjacent mountains and North Africa opposite. It flowers more freely, and I have seen it flowering very freely in the Sierra Nevada in March and April at the time the mountain snow is melting.] Two dwarf *Alliums* collected here proved to be *Allium pallens*, with heads of greenish-yellow-brown streaked flowers, and *A. roseum*, with bright wine-red flowers. On the slopes above was *Erodium cheilanthifolium*, with large compact rosettes of green ferny leaves and dark-veined rose-pink flowers. A very noticeable white-flowered plant was seen on the first visit to this locality, and left on the chance of its ripening seed by a later visit; seed ripens very quickly in these high sunburnt regions. Unfortunately on my next visit flowers and plants were being collected by a herd of goats!

By the track leading to the Cerro de Almirez the dwarf silver-grey-leaved *Pyrethrum hispanicum radicans* was one of the prettiest rock plants brightening up the few high tracks with its dainty well-poised sulphur-yellow daisy, grey-leaved plants of *Centaurea seusana*, with deep blue, short-stemmed flowers, and occasional flowering specimens of *Fritillaria messanensis*, the Fritillary of this range. On the highest point was *Artemisia granatensis*, a dainty aromatic plant with silky green-leaved cushions when small, not unlike *Eritrichium* cushions, but having only insignificant flowers. This plant is scarce, being very much collected. It is used extensively for making an "apéritif," Manzanilla or "Visana," a drink (a kind of camomile tea) taken by the natives.

I am indebted to Mr. WILMOTT, who accompanied me on the visit, for the photographs illustrating the paper, and for assistance in naming the plants. The dried plants collected are in the Herbarium of South Kensington Museum.

HOW NEW PLANTS ARE BROUGHT ABOUT.

By F. W. SANSOME, Ph.D., F.R.S.E.

[Read March 21, 1933; Sir ARTHUR W. HILL, F.R.S., in the Chair.]

EVERY horticultural show brings forward some new or improved variety of plant which has resulted from the successful work of the painstaking plant-breeder. The methods which are adopted to produce these new forms are remarkably similar to those by which early man obtained his grain crops. The breeder's eye selects a particular plant from amongst a mixed population. This plant is isolated and is propagated by seed to form a new stock.

It is highly probable that the vast majority of plants in a mixed population will not be worth propagating. In order to obtain the desired improvement it is therefore necessary to grow and study a large number of plants. The desirable form may occur only in a frequency of one in ten thousand or an even lower proportion.

Another difficulty is the fact that sometimes the desired new form will not breed true, but gives rise to other types in the progeny. Generally it will be found that this unfixable form arose originally from a cross, and can only be obtained as a hybrid. For example, the red-flowered form of *Mirabilis Jalapa* breeds true, and so does the white-flowered form. When these two lines are intercrossed a pink-flowered form is obtained. This pink-flowered form contains attributes of both red- and white-flowered plants and will be unstable, giving rise to red, pink and white flowers in the progeny.

Again, the breeder's endeavours are limited by the plant or animal itself. We cannot produce any character we like unless the plant itself possesses it. Such things as blue roses have not been produced because no plants of *Rosa* have been discovered which contain the elements of the blue character. The plant must produce a new character before we can utilize it in our work. The problem as to how new varieties are brought into being therefore resolves itself into the problem as to how new characters arise. If we can understand the manner in which the plant gives rise to a new character we are in a better position to encourage the production and to utilize the characters by hybridization and selection.

Fortunately, as a result of the scientific work of the last twenty, and more particularly of the last ten years, there is now a considerable body of information regarding the evolution of new forms. Plants, it is well known, are built up of cells as a house is built of bricks. The photograph (fig. 107) of a section through the root of *Crepis*, the Hawkweed, shows the large number of cells in this small portion of

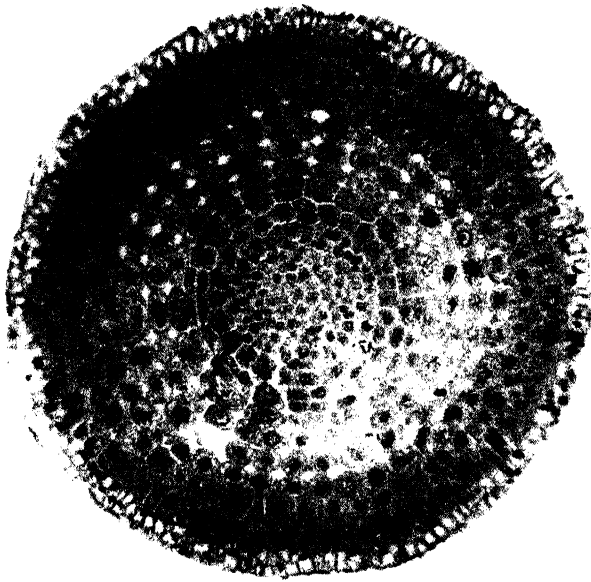


FIG. 107.—CROSS-SECTION OF ROOT OF CREPIS DIOSCORIDES SHOWING
CELLS WITH COMPLEMENTS OF CHROMOSOMES.

(With acknowledgments to Dr. M. S. Navashin.)

[To face p. 314.]



FIG. 108.—A 'CUPID' SWEET PEA GIVING RISE TO A TALL BRANCH BY FACTOR MUTATION. (L. H. H. Stone, *Journal of Genetics*, 1932).

[To face p. 315.]

the root. Each cell contains rod-shaped bodies called the "chromosomes," and these are constant in number in every body-cell of the plant. These chromosomes are practically the only bodies which remain constant in every cell of a plant. They also pass unchanged from parent to offspring.

As one might expect, therefore, the chromosomes have been proved to carry the material which is inherited by the children from their parents. This material of heredity not only determines whether a new plant will develop into a cabbage or an orchid, but also gives rise to the special characters which discriminate between one horticultural variety and another. The behaviour of the chromosomes is therefore of fundamental importance in this discussion of how new plants arise. We find that the number of chromosomes is the same in every body-cell of one plant. We find further that there are two or more of every kind of chromosome; each chromosome is represented twice, thrice or more times.

The pollen, or male element, and the unfertilized egg, or female element, of the plant contain only half the number of chromosomes found in the body-cells. This is brought about by a peculiar process known as the reduction division, which takes place in the formation of the pollen and of the eggs. The division is not a haphazard one, but is of such a nature that if the body-cells contain two of every chromosome the pollen and eggs will contain one of each kind.

The fertilization process, in which the contents of the egg fuse with that of the pollen grain, restores the double condition of the chromosomes. Therefore, within one variety or species there is generally a constant chromosome number. If the chromosomes do carry the hereditary material we expect that the hereditary characters will behave in a manner which reflects the peculiar life-history of the chromosome. GREGOR MENDEL'S work in 1865 showed that the hereditary characters were transmitted in a specific and regular way to the offspring. This so-called "Mendelian" segregation is exactly the result which one would expect from the behaviour of the chromosomes.

The inheritance of the characters of the plant is largely dependent upon the autonomy and behaviour of the chromosomes. These rod-like bodies, carried inside every plant cell, are known to contain determiners for different plant characters and to carry these at definite points along their length. For example, one chromosome in the tomato carries factors which control height of plant, shape and hairiness of fruit and type of flowering branch. These factors are situated in definite places on the chromosome and at known distances from one another. Of course there are many other factors controlling other characters on the same chromosome, but the work of isolating them is both difficult and laborious.

From the foregoing remarks it will be seen that there are two ways in which change of heritable characters can take place. Either the factor which influences a character is itself changed, or the

chromosome which carries the factor is lost, reduplicated, rearranged or becomes recombined in a new way with another chromosome.

The change in the factor itself (factor mutation) is apparently of comparative frequency, although there are few controlled experiments in plants to prove it. The many forms of *Primula sinensis*, Sweet Pea, *Antirrhinum* and other plants only differ from one another by one or more factor mutations. There is, however, an interesting case which was found by the late L. H. A. STONE, where a 'Cupid' Sweet Pea gave rise to a branch of the typical tall Sweet Pea (see fig. 108). It was previously known that the 'Cupid' differed from the tall Sweet Pea by one factor. In Mr. STONE's 'Cupid' Sweet Pea the factor for "dwarfness" had changed to the factor for "tallness."

Such factor mutations can be produced more frequently by the utilization of X-rays. As one might expect, many of these mutations are freaks or undesirable forms, but some may be of value. The use of X-rays is not yet a commercial proposition, but it is of value to the scientific experimenter, since X-ray treatment disturbs the normal functions of the plant and also strongly affects the chromosomes.

The cross between two particular plants of the white-flowered Sweet Pea 'Emily Henderson' gives rise to a coloured-flowered hybrid. By crossing together slaty-blue and coral-flowered *Primula sinensis* one produces a red-flowered hybrid. In the parents there are characters which may or may not have much effect on the plant, but which when recombined in a hybrid exert a considerable influence on its appearance.

This method of recombining characters of the parents in the hybrid has been used by plant-breeders with considerable success in the past. By hybridization one is generally able to increase the variability of the species and thereby obtain more material to select from. What will happen if we make a wholesale recombination of chromosomes? By adding, subtracting or multiplying chromosomes we alter the numbers and proportions of the character determiners. Thus we expect that new types will appear through the addition or loss of chromosomes or parts of chromosomes.

The addition of a chromosome (in a so-called trisomic) or of part of a chromosome to the usual complement is reflected by great or small changes in the characters of plants of *Datura Stramonium*, Tomato, Nicotiana, Crepis, Matthiola, and other plants.

The loss of chromosomes from Wheat, Oats, Tobacco, or *Datura Stramonium gigas* also influences the characters. Indeed in Nicotiana a new constant breeding form has been produced in such a manner.

The proportions of the factors carried on the chromosomes as ingredients of the plant have been changed; the new mixture leads to a new character expression. The loss of a minute knob-like structure from one chromosome in the Stock (Matthiola) is probably the cause of the peculiar breeding behaviour of double-throwing Stocks (Philp and Huskins, 1930).

Not only are there plants which contain an extra chromosome

or an extra piece of chromosome, but there are many which contain reduplications of all the chromosomes. In place of there being pairs of chromosomes in each body-cell the cells of such polyploid plants contain 3, 4, 5, or even more sets of chromosomes. Oats, Wheat, Chrysanthemums, Dahlias, Tobacco, and a number of fruit crops are but a few of the many polyploid plants. The presence and effects of polyploidy have only been properly realized in the last ten years. The fact that a plant may contain more than two sets of chromosomes has a far-reaching effect both on the origin of new forms and upon the plant-breeder's method of work.

Polyploidy is generally accompanied by increased vegetative vigour and greater potential variability, and frequently by either complete or partial sterility. Since there are more chromosome sets in a polyploid, there are more character-determiners present. Selection either by nature or man has therefore more hereditary material upon which to work. The greater variability, which to a large extent results from this increase in the amount of hereditary material, increases the chances of the plant to produce progeny suitable for life under special and varied conditions. It is a fact that the species on the high Scots mountains and in the Sahara are predominantly polyploid.

But the increased number of character-determiners raises difficulties that were not realized six or seven years ago. Those conversant with the breeding of Potatoes, Dahlias, Oats or Wheat will be aware that "off-types" suddenly appear in stocks which are generally supposed to be pure. These off-types are, of course, more frequent after hybridization, but they also occur in inbred lines. They are due to the appearance of characters carried as previously hidden determiners on one of the several similar chromosomes of the polyploid. The effect of these hidden determiners had previously been swamped by the determiners carried on the similar chromosomes. For analogous reasons, hybridization between two plants carrying desirable characters may not easily combine these characters in the hybrid, since the chance of combining two particular chromosomes in one plant is smaller when there are many possible chromosome combinations.

One of the greatest difficulties encountered in working with polyploids is the occurrence of sterility. When there are two representatives of every type of chromosome, the separation into one of every kind at the reduction division can be made without difficulty. But when there are more than two of every chromosome the resulting pollen and eggs may not contain a half number of chromosomes or a correct number of each type of chromosome. Pollen and eggs containing such aberrant chromosome complements are often inviable.

Sterility may also occur after hybridization between polyploids. This is especially the case when two plants containing different numbers of chromosomes are crossed. It may, however, also occur when the plants have the same chromosome number. In this latter case the reduction divisions of the parents and of their hybrid may be sufficiently different to give rise to different products in the pollen and eggs.

A typical example of the behaviour of hybrids between plants with different chromosome numbers is that of *Rubus rusticanus* var. *inermis* \times *R. thyrsiger* (Crane and Darlington, 1927). The first has 14 chromosomes in the body-cell, while *R. thyrsiger* has 28 chromosomes. A hybrid with 21 chromosomes resulted from the cross; 7 chromosomes were contributed by the egg of *R. inermis* and 14 came from the pollen of *R. thyrsiger*. The hybrid grew well but was sterile. In the formation of the pollen and eggs the reduction division separating the 21 chromosomes into two equal and similar halves would obviously be abnormal. In place of the normal division there occurs a division which gives pollen with varying numbers of chromosomes. Most, if not all, of these are non-functional since the chromosome content (and therefore the factor content) is abnormal. The chance that a functional pollen grain will meet a functional egg is rare, hence the hybrid sets no fruit.

Along with this sterile hybrid, however, was found a fertile hybrid with 28 chromosomes. This had resulted from the fertilization of an abnormal egg with 14 chromosomes from *R. inermis* with a normal pollen grain of *R. thyrsiger*. This fortunate accident where the normal reduction division in the production of the egg had not taken place, enabled CRANE and DARLINGTON to obtain a vigorous fertile bramble. This, however, is not the end of the story. The next generation from the hybrid produced plants with different combinations of the characteristic prickles and spines of both parental species. Among these were a few plants without any spines or prickles at all. These are being propagated and selected with a view to a commercial thornless Blackberry. This emphasizes the importance of continuing stocks, however unpromising, into a second generation.

The hybrids between *Primula verticillata* and *P. floribunda*, *Raphanus sativus* and *Brassica campestris*, *Nicotiana* spp., *Digitalis purpurea* and *D. ambigua*, *Phleum pratense* and *P. alpinum*, *Fragaria bracteata* and *F. Helleri*, and others exhibit phenomena which are in general similar to that of the *Rubus* hybrids. There are modifications of the general process of the origin of new forms by hybridization followed by the doubling of the chromosomes. Doubling of the chromosomes can take place in the body cells and may sometimes be artificially induced, as in the Tomato. It may take place either in the parents or in the hybrid. The doubling of the chromosomes has great possibilities for the plant-breeder, and has probably occurred in not a few instances where a new fertile form arose suddenly from among sterile forms or from a cross which was normally unproductive.

There are several practical applications of this new scientific knowledge. The knowledge that many plants of horticultural value are polyploids affords an explanation of the occurrence of some forms of sterility, and of the difficulty of obtaining pure stock of some species, and of the peculiar breeding behaviour of some plants. It is more easy to discover the practical methods necessary to overcome these difficulties when the reason for their occurrence is known.

But perhaps the greatest advantage which the recent scientific

work offers to the plant-breeder is the suggested means of overcoming certain forms of sterility and of synthesizing constant breeding new races. Practical breeders have unconsciously used such methods in their hybridization work. The hybridization among the Rubi, for example, produced the Laxtonberry, the Veitchberry and the Mahdi. With the aid of the recent knowledge on polyploids such hybridization work may be more profitably directed.

The practical breeder has no time to study the chromosome nature of the species he is working with. The scientist, however, may have studied the species from his own point of view and is often in a position to give the information which is necessary to the horticultural breeder. The considerable variation between species in regard to inheritance makes it more and more important that there should be greater co-operation between the practical breeder and the scientist. Much labour of the practical man can be saved by a knowledge of the genetics of the species being bred, and impurity of stocks may be overcome by the intelligent application of scientific knowledge. The biologist, on the other hand, would always welcome the assistance of the practical man in supplying him with new forms and "sports," particularly where these are not of commercial interest and would otherwise be lost, and for reports of any unusual breeding phenomena, the commercial grower being in a position to review a very much larger stock of plants than is ever likely to come under the eye of the experimenter.

THE REV. ALEXANDER CLEEVE, B.A., FIRST SECRETARY
OF THE ROYAL HORTICULTURAL SOCIETY.

By JAMES STEUART, O.B.E., W.S.

IN our JOURNAL of January 1931, in the very interesting account by Mr. GERALD LODER, the President, of JOHN WEDGWOOD, the founder of the Society, there was a statement that after some controversy over the appointment of a Secretary "eventually a clergyman named Cleve was appointed." The name had long been familiar to me—though with a different spelling—and I have been able to identify the first Secretary as the Rev. ALEXANDER CLEEVE, B.A., Vicar of Wooler, Incumbent of St. George's Episcopal Chapel, Edinburgh (of which I and members of my family acted as Treasurer for four generations), and at the time of his death in 1805 Lecturer at Trinity Chapel, Knightsbridge. He had a somewhat varied career, and these notes are given in the hope that they may be of interest to Fellows.

ALEXANDER CLEEVE (fig. 109) was the son of JOHN CLEEVE, Officer, Royal Navy, of H.M.S. *Sutherland* (born about 1704, died 1769), by his wife LUCY, and was born at Westminster in 1747 and baptized at St. Margaret's, losing his mother when an infant. His father being then at sea he was taken under the guardianship of Colonel WILLIAM EGERTON, an old friend of the family, and son of the Hon. and Right Rev. HENRY EGERTON, D.D., Bishop of Hereford and grandson of the third Earl of Bridgwater.

He was educated at Eton College and matriculated at Queen's College, Oxon, 1766, aged eighteen.* He however did not long remain at Oxford as he, described as "of London," was admitted sizar at St. Bene't or Corpus Christi College, Cambridge, on July 6, 1767. On March 15, 1768, he was appointed librarian; leave was granted him for the B.A. degree on April 24, 1770, which he obtained in 1771.† Letters testimonial for deacon's orders were granted on May 7, 1770.

After his ordination he was appointed Chaplain to the county gaol at Cambridge.‡ He also held the appointment of Chaplain to the Right Hon. SAMUEL EGERTON, M.P., seated at Tatton Park, Cheshire. In 1772 he was presented by the Right Rev. JOHN EGERTON, D.D., Bishop of Durham, the eldest brother of Colonel WILLIAM EGERTON, his guardian, to the Vicarage of Stockton-on-Tees, but resigned in 1780, on his appointment as Vicar of Wooler, a parish in Northumberland, an office which he held until his death. The duty at Wooler appears to have been taken by him from May 1780 to June

* *History of Northumberland*, 1922, vol. ii. p. 295.

† JOHN VENN, *Records of C.C. Coll. and Graduati Cantabrigienses*, 1823.

‡ *Gentleman's Magazine*, vol. 75, p. 974.



FIG. 109.—THE REV. ALEXANDER CLEEVE
(from a miniature).

[*To face p. 320.*

1781 and at no other time, about eleven different curates officiating during the period which intervened before the arrival of his successor in 1805. The absentee vicar next appeared in Edinburgh where he probably went in 1781, though the exact date has not been ascertained.

At that epoch the Episcopal Church in Scotland was under a cloud consequent upon the sympathies of many of its members with the Jacobite risings. Penal Statutes were passed against unqualified clergymen, known as non-jurors, who had not taken the oaths to the Hanoverian Government, and no clergyman's letters of orders were to be considered valid unless conferred by an English or Irish bishop. These statutes (not repealed until 1792) imposing these restrictions upon the native Scottish Episcopal clergy naturally presented an opening for employment in Scotland of clergy of the Church of England, and the presumption is that these circumstances formed an inducement to Mr. CLEEVE to move to Edinburgh while *de facto* remaining Vicar of Wooler. In January 1781 he let the tithes of Wooler and the glebe lands to a farmer at a rent of £200 under the burden of paying £50 to a curate. The probability seems to be that he removed to Edinburgh at that time.

It is interesting to note that Sir WALTER SCOTT recorded in his "Ashestiel Memoir" to be found at the beginning of Lockhart's *Life*, that "when grown a big boy, I had a few lessons from Mr. STALKER of Edinburgh, and finally from the Rev. Mr. CLEEVE."

Mr. CLEEVE was one of the clergy who attended the notorious Deacon BRODIE to the scaffold on October 1, 1788, the trial having caused great excitement in Edinburgh where BRODIE, who was a well-known cabinet-maker, had for long carried out a system of secret house-breaking, his dual existence culminating in the daring robbery of the Excise Office, for which he was sentenced to be hanged.

The building of the New Town of Edinburgh, begun about 1770, rapidly extended. To meet the religious needs of the members of the Episcopal community, Mr. CLEEVE ministered to a congregation that met in a room or hall over a pastry-cook's shop in West Register Street; the building being afterwards occupied as JOHN MOIR's printing office.* In 1786 he published a "Selection of Psalms and Hymns, chiefly intended to be used in the Episcopal Chapel, New Town, Edinburgh, by A. C."

Mr. CLEEVE must have soon established his position in Edinburgh, for in April 1792 "Proposals for building and establishing by subscription an Episcopal Chapel in the New Town" were agreed to, in which it was stated that the chapel was to be "for the advantage of the Reverend Mr. Cleeve." A site was procured in York Place, then forming a part of Queen Street, and building was begun according to designs by JAMES ADAM, brother and partner of the famous ROBERT ADAM, the cost being raised in £25 shares, bearing interest at 5 per cent. On Sunday, November 17, 1793, the chapel, known as St. George's Chapel, was opened for divine service. In the same year

* GORDON'S *Scotichronicon*.

Mr. CLEEVE published a Selection of Psalms, from Tate and Brady's Version, second edition, printed in Edinburgh for Peter Mills and G. Kearsley, London. In 1795 he also published at Edinburgh an abridgment by himself of "Christology, or a Discourse Concerning Christ," by the Rev. ROBERT FLEMING. Mr. CLEEVE appears to have received the balance of the seat rents after meeting the interest on the £25 shares, but after a time the revenue decreased, and he made an arrangement for a successor at St. George's.

He removed to London in 1800, where he became Chaplain to the Duke of Portland (afterwards Premier of England) and Lecturer at Trinity Chapel, Knightsbridge. This chapel stood on the north side of Knightsbridge between two public-houses, which it is said were the resort of footpads who waylaid travellers to the isolated village of Kensington. The chapel was anciently attached to a Lazar House or Hospital, was enlarged in 1789, and made into a Parish Church in 1860.* About thirty years ago the chapel was sold and was removed to make way for an extension of the French Embassy at Albert Gate, being superseded by the Church of the Holy Trinity, Kensington Gore, built in Prince Consort Road, curiously enough on part of the site of the old Horticultural Society Gardens.

Mr. CLEEVE became associated with the Royal Horticultural Society at its inception in 1804. It is not now known how he became interested in horticulture, but at the meeting on May 30, 1804, he was elected Secretary for the ensuing year, and was present at the subsequent meetings, including that on April 2, 1805, at which, in consequence of the necessity of economy in the infancy of an institution, Mr. R. A. SALISBURY offered to act as Secretary without any emolument and in case of absence the Rev. GEORGE GLASSE offered his assistance to the Society gratis, which offers were accepted. It was then resolved unanimously "That the thanks of the Society be given to the Rev. A. CLEEVE for his useful labours as Secretary; that the Council be desired to allow him such remuneration as they shall think sufficient; and that he be entitled to attend all the meetings of the Society in future." The Rev. A. CLEEVE returned his grateful thanks to the Society and offered his services to continue henceforward as Assistant Secretary without any emolument. It was then resolved unanimously "That the offer of the Rev. A. Cleeve to act as Assistant Secretary be accepted; and that in case of his and R. A. Salisbury Esq.'s absence, the Rev. Geo. Glasse should be applied to."

Mr. CLEEVE was present at several subsequent meetings till June 11, but he died at Knightsbridge on September 20, 1805. He was buried at St. Margaret's, Westminster, where he was baptized, and where there is a memorial tablet. It may be conjectured that his death was sudden, as at a meeting of the Society on November 5 it was reported that "the Minutes of the last meeting being at present in the hands of the widow of Mr. CLEEVE (lately deceased) could not be read."

* HENRY G. DAVIS, *Memorials of Knightsbridge*.

In the following year a volume of Mr. CLEEVE's Sermons was published, dedicated by permission to Queen Charlotte, in the preface to which he is described as "an admired preacher in the neighbourhood of the Metropolis."

Mr. CLEEVE in 1773 married LOIS LAY, of Norwich, who survived him and died at an advanced age. They had five sons and five daughters. Of the daughters two died at London in 1804.* Three of the sons survived their father :

(1) ALEXANDER FREDERICK, born 1775, was in H.B.M. Consular Service, but in 1805 he joined the Royal Corsican Rangers, one of the Corps raised during the Napoleonic Wars. He held the post of Paymaster, but died of the plague at Corfu, July 21, 1814.†

(2) WILLIAM, born 1780, who was a Lieutenant-Colonel, R.A., and died in 1831 in command of the R.A. at Dover. He distinguished himself in the war in the West Indies and was specially promoted and awarded the Fleur-de-lis by Louis XVIII. He had three sons in the Army and two in the Royal Navy, and of their descendants various members have distinguished themselves both in the Navy and Army.

(3) CHARLES, born 1783, who was an M.D. of Edinburgh, went to America in 1831.

I am indebted to Colonel S. D. CLEEVE, C.B., grandson of Colonel WILLIAM CLEEVE above-mentioned, who has very kindly supplemented my researches by supplying various biographical details, and has also furnished a photograph of a miniature of his great-grandfather herewith produced (fig. 109).

* *Scots Magazine*.

† Noted in Army List in War Office Library.

SAMUEL CURTIS, F.L.S., 1779-1860.
(Editor, Curtis's Botanical Magazine, 1827-1846.)

By A. B. BURLEIGH.

THE signed portrait of SAMUEL CURTIS, which is reproduced in fig. 110, is copied from a photograph taken at St. Helier, Jersey, and sent by him from "La Chaire" to his youngest daughter on his seventy-ninth birthday. The garden at "La Chaire," naturally beautiful, was a fitting surrounding to the passing of one who all his life was so devoted to the cultivation of flowers and trees.

The square-built house under the cliff's shelter had trained to it the sweetly scented Magnolia, with blue Hydrangeas conspicuous on the rocks above. Facing the house, off the main path, flourished double white and other Camellias, of which genus he wrote in 1819.

To the north-west, dominating the whole, grew a fine Eucalyptus tree which later reached a height of 80 feet, being then esteemed the largest specimen in Europe. Unhappily this and many subtropical shrubs and plants were destroyed by the great blizzard of February 1895 and the severe weather following it.

SAMUEL CURTIS was born at Walworth in Surrey, August 29, 1779. He died at "La Chaire" on January 6, 1860, finding rest in the peaceful churchyard at St. Martin's, near Rozel. He was the seventh child of JAMES CURTIS, surgeon and apothecary; and a great-grandson of THOMAS CURTIS, M.D., who married ELIZABETH COWDRAY (a lady of county family in Berkshire) and who joined the Society of Friends during the lifetime of their founder, GEORGE FOX.

Like many of the early Quakers THOMAS CURTIS was of ancient lineage, his coat of arms bearing in chief the Crown of Bohemia, a most unusual "addition" granted to an ancestor, HENRY GEORGE DE CURTEYS, about the end of the fourteenth century.

SAMUEL CURTIS (1779), despite the very considerable difference in his age, was first cousin to WILLIAM CURTIS (1746), founder of the Botanical Magazine, and author of *Flora Londinensis*, of whom Dr. R. J. THORNTON (1768-1837) wrote:

"He was a true and faithful husband; an affectionate and tender father to an only daughter on whom he bestowed a most liberal education."

This talented young lady at the age of nineteen became the wife of SAMUEL CURTIS, their marriage taking place on October 19, 1801.

At the commencement of the nineteenth century CURTIS possessed a nursery garden of considerable importance at Walworth. It was from here he decided upon the publication of a floral work to be illustrated from nature by full-size coloured plates of surpassing excellence.



My dear Georgiana,
 Yours affectionately
 Samuel Curtis
 Dublin, 1850.
 Jan'y 29. 1850.

FIG. 110.—SAMUEL CURTIS, F.L.S.

[To face p. 322.]

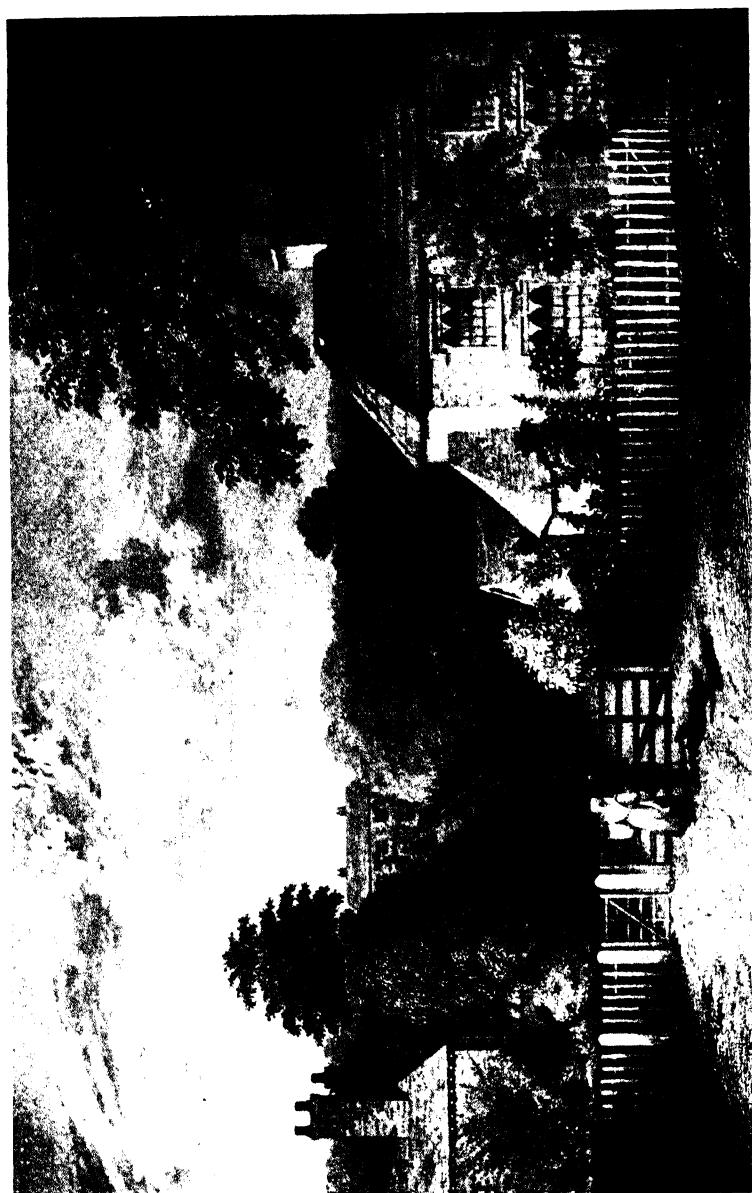


FIG. 111.—GLAZENWOOD, BRADWELL-JUNTA-COGGESHALL, ESSEX.

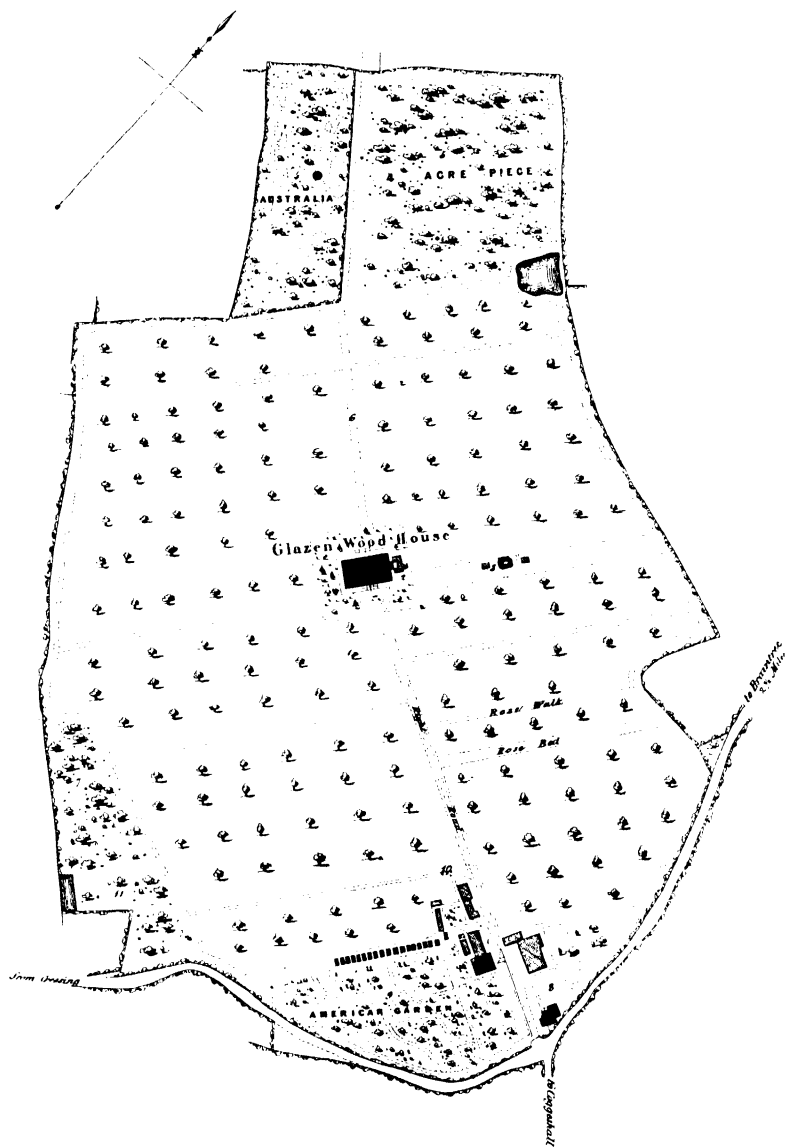


FIG. 112.—PLAN OF GLAZENWOOD, 1847.



FIG. 113.—THE VALLEY, LA CHAIRE, LOOKING WEST, 1903.
Eucalyptus. 80 feet high above the house.

To face p. 325.

Upon this work, *The Beauties of Flora*, he engaged two artists of repute: first, THOMAS BAXTER, and, later, CLARA MARIA POPE.

From the original title-page, 1806, which portrays the goddess Flora protecting her flowers from storm and tempest, we learn that the specimens chosen were from the select collection of Mr. CURTIS.

The first coloured plate, "Tulips," of which few copies exist, was engraved by J. HOPWOOD with aquatinting by F. C. LEWIS, and published from Walworth, January 1, 1806. This was followed later by "Carnations," "Ranunculus," "Hyacinths," "Anemones," "Auriculas," "Pinks," "Polyanthus," and two groups of early hybrid "Dahlias," 1818, by Mrs. POPE.

The whole ten plates and revised title-plate, "published by S. Curtis, Gamston, Notts, 1820," are in the library of the British Museum (Natural History), South Kensington, being bound in with CURTIS's Monograph on the Genus *Camellia*, 1819, a work which greatly promoted the development of this beautiful genus of flowering shrubs.

From Walworth CURTIS went to reside at Glazenwood, Essex, 1808, where his fourth daughter HELEN (Mrs. ALFRED TUCKETT), 1809, and his son SAMUEL (1812), who later held a commission as Captain, and took part in the first Chinese war, were born. Two other sons were born to Mr. and Mrs. CURTIS, one, JAMES (Dr. JAMES CURTIS, of Brighton), at Ashley, a hamlet near Ringwood, 1814; and, whilst in temporary residence at Worksop, 1816, ALFRED, who died at sea.

From 1816 to 1821 Mr. CURTIS was employed by the DUKE OF NEWCASTLE at Clumber, as the following extract from a letter to his daughter CAROLINE, 1853, shows:

"As the Duke of Newcastle's Land Agent I chose for my residence Gamston Hall, where Robin Hood was brought up. At that time Gamston was a village in the limits of Sherwood Forest.

"Nathaniel Mason, who had acted as the Duke's lawyer on most occasions, had died in the house, and his effects were to be sold.

"I was in temporary residence at Worksop at the time of the sale. . . . This picture was then up, and he knocked it down to me. . . . This was in 1818."

The painting here referred to is a "Magdalen," of an early Italian school.

The publication of the *Camellia* monograph in 1819, which by permission was dedicated to Her Grace GEORGIANA ELIZABETH, DUCHESS OF NEWCASTLE, was directed by CURTIS from Gamston.

Full-size coloured groups were issued with this work, after CLARA MARIA POPE, a noted English painter of portraits, miniatures, and flowers. She was the daughter of JARED LEIGH, and married, first FRANCIS WHEATLEY, and after his death in 1801 became the wife of ALEXANDER POPE.

From records in the possession of Mrs. BRADHURST, of Rivenhall Place, Essex, it appears that the first house built at Glazenwood, and occupied by CURTIS, was erected by JOSEPH GREENWOOD, of Coggeshall,

about 1803 ; previously it had been described as a parcel of woodland called " Glazenwood."

In 1819 GREENWOOD sold the property to SAMUEL CURTIS, who built the lodge or villa at the entrance gates, some 300 yards south of the house. He also erected glass structures, and planted, at great cost, a wonderful collection of trees and shrubs. Tradition asserts that "*Curtis grew every kind of tree of note known to exist in the British Isles.*" Amongst these were the rare *Ginkgo biloba*, the Maidenhair tree, and *Quercus Phellos*, the Willow Oak, from N. America, fine specimens of which still remain not far from Mr. BARTON'S extensive Peach houses on the estate, Cedars near and Magnolias on the house.

Leaving Gamston Hall in 1821 Mr. CURTIS came to his new home at Glazenwood. Fig. 111, which is taken from a drawing by his eldest son WILLIAM (1804-1887), made before he visited Australia, shows the house, with lodge and entrance gates, from the Braintree Road.

Mr. PERCY THOMPSON of the Essex Field Club quotes WHITE'S Gazetteer of Essex, " that, by 1848, 52 acres had been laid out, and planted as nursery, orchard, and pleasure grounds ; by Samuel Curtis, publisher of the Botanical Magazine, now of Victoria Park, London."

Some idea of the position of Glazenwood House, which has a frontage of 100 feet, and the surrounding gardens, may be obtained by reference to fig. 112, a copy of a reduced survey prepared in 1847.

After Mr. CURTIS left Glazenwood it was taken over for eleven years by the Rev. Sir JOHN PAGE WOOD, Bt., Vicar of Cressing, whose youngest son, Field-Marshal Sir HENRY EVELYN WOOD, V.C., spent his childhood there. Once, on the lake, where grew the Water-lilies, and swans arched their graceful necks, a tragedy nearly happened. Sir JOHN'S two boys, EVELYN and his elder brother CHARLES, ventured to navigate the pond in a tub, which sank, but they were fortunately rescued from drowning by a gardener.

Sir JOHN and Lady WOOD were friends of Mr. CURTIS and his family for many years. Lady WOOD (who was the daughter of Admiral SAMPSON MICHELL, of Croft West, Cornwall, and was born at Lisbon) was a remarkably clever artist, and several of Mr. CURTIS'S most notable flowers, introduced into England and first grown by him, gained additional notoriety from her accurate paintings.

After WILLIAM CURTIS'S death in 1799, and until 1826, the first series of the Botanical Magazine was continued by Dr. JOHN SIMS, F.L.S.

It was originally published by its founder from Lambeth Marsh in 1787, and its long continuity remains unbroken. The Royal Horticultural Society still publishes the magazine with hand-coloured plates as of yore !

The " New Series " was commenced in 1827 by SAMUEL CURTIS, then a Fellow of the Linnean Society of seventeen years' standing. He directed it from Glazenwood, being so fortunate as to have for collaborator WILLIAM JACKSON HOOKER, Regius Professor of Botany in the University of Glasgow.



FIG 114.—LA CHAIRE ROZEL BAY, JERSEY LOOKING EAST



FIG. 11, —LA CHAIRE ROZEL BAY, JERSEY 1877

To face p. 327

In 1846, at the time of the repeal of the Corn Laws, Mr. CURTIS sold his rights in the Magazine, but the name "Curtis" was, and still is, retained. During the nineteen years he published it CURTIS doubtless received great help from his talented daughters, four of whom are known to have excelled at flower-painting in water-colour.

When his little GEORGIANA was but 3½ years old, he had the misfortune to lose his devoted wife, "who contracted a chill in the big conservatory." She died July 2, 1827, and is buried in Bradwell Churchyard, having been the mother of thirteen children.

In 1845 the laying out of Victoria Park, Bethnal Green, one of London's largest open spaces, led to Mr. CURTIS's removal thither, though during the period of transition he still retained the Lodge and other portions of the Glazenwood estate.

Information kindly supplied by Mr. MAURICE BUTT of the London Museum states that the laying out began in 1842, but the Park was not open to the public till 1845.

Mr. MONTAGUE H. COX of the L.C.C. Offices also furnishes the following extract of minutes dated October 10, 1845: "The Chief Commissioner acquaints the Board . . . that the expediency of committing the ground works . . . to some one of acknowledged experience, and judgment . . . had turned his attention to Mr. Curtis, late of Glazenwood, of whose competence for the superintendence of this work he had himself some knowledge and to whose ability as a practical arboriculturalist, the highest testimony was borne by Sir William Hooker, Director of the Royal Botanical Garden at Kew . . . finally, that considering a period of not less than two years to be requisite . . . Mr. Curtis would be willing, for that period, to devote his whole time and attention to the duties thus pointed out to him."

A report signed by SAMUEL CURTIS, November 25, 1845, giving an estimate of the cost of the work, was submitted to the Commissioners, and on December 2 he furnished a list of trees and shrubs immediately required.

Mr. CURTIS possessed a kind and sympathetic nature which in private life earned for him the esteem of many, and the love of his children.

During his retirement at "La Chaire," from 1852 until his death, he had the companionship of his daughter HARRIET, an accomplished lady, the widow of Dr. SAMUEL FOTHERGILL. She was greatly interested in preserving and mounting specimens of the many species of seaweeds for which Jersey is so noted.

Letters from Mr. CURTIS at "La Chaire" (1841-42) show him, even then, engaged in building the house and laying out the garden.

The latter ultimately became a veritable sun-trap, hedged round on the East by a deep belt of Ilex, extending from the valley road up to the South face of the rocks. This is clearly shown in fig. 113, which gives an early morning view of the valley as it rises westward from Rozel Bay.

Towards the West, similarly protected by Ilex, were planted

groups of Himalayan and other Rhododendrons, some of which later reached a height of 20 feet. *Rhododendron arboreum*, *R. Falconeri*, *R. Edgeworthii*, *R. campanulatum* and a fine hybrid raised at "La Chaire" between *formosum* and *Edgeworthii* all flourished there with Acacias *Eriobotrya japonica* (which fruited), *Thea viridis*, *Olea sativa* and *O. fragrans*. Along paths winding up from the house over the South face of the rocks grew brilliant masses of *Mesembryanthemum tricolor*, and here, sometimes, the timid green Lizard showed itself from the rocky crevices.

At its summit the "Pulpit" rock had been levelled to form an emplacement whence (during the Napoleonic wars) a battery of 24-pdr. guns commanded the roadstead.

Two essential conditions unquestionably decided Mr. CURTIS to choose this tiny valley, which in photographs, viewed from the East (fig. 114), has often been mistaken for mountainous country. (1) He knew the partiality of Rhododendrons, etc., for a mild and temperate climate and screened these and other choice shrubs by his lofty Ilex hedges. (2) While the rest of Jersey is granite, he foresaw that this particular corner, being of purple conglomerate, could be disintegrated by tree roots into soil eminently suited to his subtropical shrubs.

These shrubs were selected with such judgment that forty or fifty years later the "Tropical Garden of La Chaire" (locally so called) had become one of the principal "show" places of the island, which every tourist expected to visit.

SAMUEL CURTIS loved flowers all his life—his trees, his shrubs, his plants under glass, and the wild flowers of the Essex woods.

Perhaps there is a reflex of his mind suggested in the following lines by THOMSON, which appear on the title-page of the Botanical Magazine for 1829 :

"Soft roll your incense, Herbs, and Fruits, and Flowers,
In mingled clouds, to Him, Whose Sun exalts,
Whose breath perfumes you, and whose pencil paints"—

for the life of SAMUEL CURTIS began amongst flowers, and thus it ended.

In him, throughout his long career, the beneficent influence of horticulture upon the mind of man was exemplified. May its far-reaching power for good ever continue to form ties of friendship between the nations of the Earth.

In tracing this account of my grandfather, I have received great assistance from my cousin, Major G. H. ROOKE; and I have also to thank many others who have helped me, especially Mrs. BRADHURST of Rivenhall; the Director, Royal Botanic Gardens, Kew; the Rev. T. DAVIES of Bradwell; the Rev. R. LE SUEUR of St. Martins, Jersey; Mr. A. C. CURTIS of Bovey Tracey; Dr. F. TOTHILL of Staines; and Mr. W. F. BURLEIGH of Belmont.

THE NYMANS GARDEN LIBRARY.

By ELEANOUR SINCLAIR ROHDE.

WHEN the Publications Committee of the R.H.S. asked me to write an account of the Nymans Garden Library the prospect filled me with pleasure and at the same time with despair. I have known this remarkable library for many years, and have frequently had the privilege of working in it, and in many ways it would be easier and certainly more satisfactory to write a volume on each section of it. In the limited space of an article it is only possible to say a little about the outstandingly important items in each section, viz., Incunabula and other early works; German works; Flemish works; English works; Swiss works; Italian works; French works.

INCUNABULA AND OTHER EARLY WORKS.

It is a pleasant fact that the earliest book of plant interest to be printed was by an Englishman—Bartholomaeus Anglicus. His *De Proprietatibus Rerum* (which contains 19 books) was the standard work on Natural History throughout the Middle Ages and was one of the books hired out at a regular price to the scholars of Paris. The author is sometimes erroneously called Bartholomeus de Glanville, and Mr. Leopold Delisle tried to claim him as a Frenchman, but though he spent the greater part of his life abroad he was an Englishman. Salimbene, the Parmese chronicler, writing in 1283, refers to him as Bartholomaeus Anglicus; John de Trittenheim, Abbot of Sparheim, during the closing years of the fifteenth century, writes of him as "Bartholomeus natione Anglicus," and Bateman, in his edition (1582) of *De Proprietatibus Rerum*, describes him as "of the noble familie of the Earles of Suffolk." Bartholomaeus Anglicus was one of the most renowned theologians of his day and ranks with other thirteenth-century thinkers, such as Roger Bacon, Thomas Aquinas, and Albertus Magnus. We know very little of Bartholomaeus's life beyond that he taught in Paris. In 1230 the general of the Friars Minor, in the new province of Saxony, asked the provincial of France to send Bartholomaeus and another Englishman to help in the work of that province, and the former subsequently went there. His great book must have been written about the middle of the thirteenth century, for though he cites Albertus Magnus, who was teaching in Paris in 1248, there is no mention of later writers, such as Thomas Aquinas, Roger Bacon and Vincent de Beauvais. Both in England and France there are a considerable number of manuscript copies of *De Proprietatibus Rerum*, most of them dating from the latter part of the thirteenth and early part of the fourteenth century. The work was translated into English

in 1398 by John de Trevisa, chaplain to Lord Berkeley and vicar of Berkeley. The seventeenth book of this encyclopaedic work treats of plants and, unlike so many of the early books, it is full of delightful descriptions which show that the writer was a true lover of flowers and not merely concerned with their medicinal uses. Amongst the most notable (too long, alas! to quote) are his descriptions of the rose, the Madonna lily, the violet, apple trees (he describes the taste of an apple as "merry," which is, I think, both delightful and accurate) and vineyards, and in the section on woods he gives a graphic picture of a great forest, the birds and the bees in it, the "weary wayfaring travelling men" and the interesting custom of tying knots in the trees to show the way and of the robbers who deliberately removed them and put up "false tokens and signs." The copy of this book in the Nymans Library is one of the earliest, the 1485 edition, printed at Cologne by Ulrich Zell. The book was first printed at Basle about 1470 and went through at least 14 editions before 1500. The French translation was first printed at Lyons in 1482 (followed by later editions), the Dutch translation at Haarlem in 1485, and the first Spanish translation at Burgos in 1494.

An outstandingly important volume is a copy of the issue dedicated to Cardinal Gonzaga, of the *Herbarius* of Apuleius Barbarus, printed at Rome in 1480. This is one of the rarest books, not only in garden, but in all literature, there being very few known copies in Europe and one imperfect copy in America. Apart from its rarity this herbal is of the first importance in the history of botany and medicine. The original work is supposed to date from the fifth century, though no copy so ancient as this is in existence now. The work, therefore, probably had a career of nearly a thousand years in manuscript before being printed, and there are numerous MSS. of the book, chiefly in Italian libraries, several being in the Laurentian Library. The Saxon translation (now in the British Museum) is supposed to date from A.D. 1000-1050. The book was first printed at Rome, probably soon after 1480, by Joh. Philippus de Lignamine (physician to Sixtus IV), who states that he found the MS. in the library of the monastery of Monte Cassino. There are two variants, the first issue being dedicated to Cardinal Gonzaga, and the second to Cardinal de Ruvere. The copy in this library is of the first issue. The illustrations are probably the earliest representations of plants in a printed book.

Another of the incunabula is a copy of *Ortus Sanitatis* (*circa* 1500) printed in Paris by Vérard. This is the first French edition of the Latin *Hortus Sanitatis* and is a beautiful specimen of early French typography. This first edition is excessively rare, only very few other copies being known. The copy which formerly belonged to Henry VII of England is now in the British Museum. One of the most interesting illustrations (first used in Tardif's *Art de Fauconnerie*, 1492) represents a writer presenting his book to a king on horseback, and in the background men flying hawks. This is probably the earliest French woodcut showing hawking. There is also a copy of the 1517 edition

of the Latin original, printed at Strassburg. This is the first edition of the *Hortus*, issued by Renatus Beck, the successor of Prüss. The fine title border was drawn by Urs Graf. Yet other treasures are one of the few known copies of the 1508 edition of the *Gart der Gesundheit* and the 1515 edition printed by Renatus Beck, bound in the original tooled vellum, and coloured by hand. This is the first edition of this book from this printer's press, and another fine copy is the 1536 edition, printed by Matthio Apiario, in its original beechwood and tooled vellum binding. The *Gart der Gesundheit* is one of the most important medieval works on natural history and it is a landmark in the development of botanical illustrations. Further, it was one of the earliest books printed in the German language and of profound interest to students of dialects and folk-lore. The book is of an encyclopaedic character and was probably the work of several scholars, including possibly Dr. Johann von Caub, the great Frankfort physician during the latter years of the fifteenth century. Another early treasure is the 1539 edition of the *Herbolario Volgare*, printed at Venice by Palamides. This is an Italian translation of the *Herbarius Latinus*, the earliest herbal printed in Germany. Dr. Klebs suggests the original work was not written at the time it was printed, but may have had a previous career in manuscript for at least a century. The book treats almost entirely of homely remedies made from herbs growing in the fields and meadows. They are all native German or garden plants and the names are given in German as well as Latin. The herbs are arranged in alphabetical order.

There is also a particularly fine copy of Pliny's *Historia Naturalis* (1480). The copy of Petrus Crescentius' *Opus ruralium commodorum* (1486) is in the original stamped skin. This was the most important treatise on agriculture and gardening produced during the Middle Ages. It was written during the latter half of the thirteenth century, was one of the earliest books to be printed, and was subsequently translated into Italian, French and German, but, curiously enough, never, so far as is known, into English. There are also copies of the Italian translations of 1519 and 1561, and an edition printed at Basle in 1548.

Another early book of the first importance is a copy (*circa* 1520) of the *Grand Herbar*, formerly believed to be a translation of some German herbal, but according to Meyer (*Geschichte der Botanik*) a French translation of *Circa instans*. The *Grand Herbar* was translated into English and printed by Peter Treveris in 1526 with the title *The Grete Herball*. This is the most famous of the early herbals printed in the English language. It is interesting to note in passing that this book contains the earliest avowal of disbelief in the supposed powers of mandrake. Treveris printed also the English translations of Hieronymus Braunschweig's works. The more important of these—*The Vertuous Book of the Dystillation of the Waters of all manner of Herbs*—was illustrated from the same cuts as those in the *Grete Herball*. There is a fine copy of the original German work in this

library. The author was a celebrated Strasburg doctor during the closing years of the fifteenth and early years of the sixteenth century.

Two small, extremely rare volumes are two editions of Walafred Strabo's *Hortulus* (fig. 116), the one printed at Vienna in 1510 and the other at Nuremburg in 1512. Of the edition printed at Nuremburg this is apparently the only known copy. *Hortulus* is the earliest medieval gardening book that has come down to us. It was written in the ninth century by the monk, Walafred Strabo, who at the request of Charles III wrote a life of Charlemagne. It is a very human little treatise and gives us a vivid picture of the garden which Walafred Strabo made and of the flowers and herbs he grew in it. One sentence in it bridges the centuries in a flash: "The gardener must not be slothful but full of zeal continuously, nor must he despise hardening his hands with toil."

GERMAN WORKS.

One of the rarest of the early German books is a copy of the first edition (1532) of Brunfels' *Herbal*, also of his *Kreuterbuch* (Strasburg, 1539) in the original wooden covers and stamped calf. Otto Brunfels (born *circa* 1464) was the son of a cooper near Mainz, who became a Carthusian monk. He was influenced by Protestant doctrines, fled to Strasburg and ultimately became city physician at Berne. His *Herbal* is noteworthy, not for the letterpress, which is poor, but for the beauty of the illustrations, this being the first herbal adorned with drawings which are both true to nature and beautiful. Other noteworthy volumes are the first edition (bound in old vellum) of Hieronymus Bock's *Neue Kreuterbuch*, printed at Strasburg by Wendel Rihel in 1539, a copy of the first illustrated edition (1546) in the original stamped pigskin over wooden boards with the old clasps, also a copy of the 1587 edition, with colour cuts, in the original stamped skin, and the *Tragi de Stirpium* (1552). Hieronymus Bock was a most gifted botanist and he may indeed be described as the earliest forerunner of Linnaeus. He was the first writer to note the time of the annual flowering of the plants he described.

Most magnificent of all is the array of Fuchs's works, including the first edition (Basle, 1542) of his *De Historia stirpium*. Leonard Fuchs, in many ways the greatest of the early German botanists, was noted as a physician and as a university lecturer, whose fame in both capacities spread beyond his native land to England and Italy. His famous work—*De Historia stirpium*—a Latin herbal dealing with roughly four hundred native German and a hundred foreign plants, is a botanical masterpiece. The book owes much of its charm not merely to the scholarship of the author and the remarkable beauty of the woodcuts (there are over 500) but also to the fact that it was obviously a labour of love. In the opinion of many it is the most beautiful of all herbals. A remarkable feature of this book are the portraits, for not only the names but the portraits of the author, the draughtsmen (H. Fullmaurer and A. Meyer) and the wood-cutter (V. R. Speckle) are given, and these

portraits give the impression of being true to life. To Americans this herbal is of special interest, for it contains the earliest figures of the American plants which attracted most attention when first introduced. Of these the drawing of *Cucurbita maxima* is particularly fine. Amongst other valuable books are Egenolph's *Herbarum imagines vivoe* (1535) and his *Plantarum*; the rare first illustrated edition of Dioscorides translated by Ruellio, containing 595 woodcuts of plants, published by Egenolph at Frankfort in 1543; Albertus Magnus' *Drei Bücher*, published by Egenolph (1536), and his *Buch der Versammlung*, published at Strasburg in 1508, also the first edition (1588) of Joachim Camerarius's most important work, *Hortus medicus*, and his *Symbolorum et emblematum* (Nuremburg, 1590-95), bound in old calf gilt. Joachim Camerarius the younger, after studying at Wittenburg and travelling in Hungary and Italy, ultimately settled at Nuremburg, where he had a garden noted for rare plants. He was the son of the more famous Joachim Camerarius, one of the outstanding figures in the literary world of Germany in Renaissance times.

Amongst the later German volumes may be noted Porta's *Phytognomonica* (Frankfort, 1608), wherein the author set forth his curious doctrine of signatures, and the rare third issue of Besler's *Hortus Eystettensis* (1713). This book was first published in 1613 and again in 1640. The plates in the 1640 issue were so inferior that a few better copies were issued in 1713. There are also copies of Trew's *Hortus nitidissimis* (1768), which is probably the most beautiful record of the cultivated flowers of this period, and his *Plantae selectae* (1750-73); Knorr's *Thesaurus rei herbariae hortensisque universalis* (Nurnberg, 1770-72), one of the finest of the eighteenth-century German flower books, and Knorr's *Abbildung aller oekonomischer Pflanzen* (1786-96).

FLEMISH WORKS.

The herbals by botanists of the Low Countries are noted not only for their intrinsic value, but also because so many of them were printed by that princely publisher Christophe Plantin of Antwerp, whose personality earned him a unique place in the literary world. With the exception of Fuchs's works, those of the Flemish herbalists are the most splendid of the Renaissance period, and to English people they are of peculiar importance for their influence on our botanists. The best known English herbal—Gerard's—is virtually a translation of the *Pemptades* of Dodoens; Henry Lyte's translation of Dodoens' *Kruidboek* was the standard work on plants in this country during the latter part of the sixteenth century, and Parkinson incorporated much of de l'Obel's unfinished work in his *Theatrum Botanicum*.

Rembert Dodoens, the greatest of the Flemish herbalists, after travelling in France, Italy and Germany, had been physician to the Emperors Maximilian and Rudolph II, and ultimately became Professor of Medicine at Leyden. His first work—*Kruidboek*—was published in 1554 by Jan van de Loe, and a French translation by his

intimate friend, Charles de l'Escluse, appeared in 1557. The Latin version, for which new blocks were engraved, was published by Plantin in 1583. There is a fine copy in the Nymans Library of this beautiful book, also of the French translation by de l'Escluse, and both editions of the English translation by Henry Lyte. Charles de l'Escluse, who had suffered much for his adherence to the Protestant faith, was a friend of Sir Francis Drake, who brought him plants from the New World. Copies of all de l'Escluse's works are in this library—*Rariorum aliquot stirpium per Hispanias observatorum historia* in its original calf, *Rariorum aliquot Stirpium per Pannonianum Austriam et vicinas in old vellum*, also *Aromatum et simplicium* in old stamped vellum. All these and his translation of Monardes' famous book were published by Plantin. Matthias de l'Obel, a Fleming by birth, had been physician to William the Silent. Accompanied by his friend Pena, who had been physician to Louis XIII, he came to England and settled here. He became superintendent of Lord Zouche's garden at Hackney and was ultimately made botanist to James I. There are copies of all de l'Obel's works in this library, including the first edition (1576), bound in old stamped vellum, of his *Plantarum Historia*, his *Stirpium Adversaria Nova*, written in collaboration with Pena, dedicated to Queen Elizabeth, and published by Thomas Purfoot, London, in 1571, and his *Balsami opobalsami*, bound in old calf and stamped with the arms of Bishop Huet of Paris, 1692.

There is a fine copy, too, of the most valuable of the Flemish gardening books, *Hortus Floridus*, by Crispin de Pass. This beautiful volume, of which no two copies appear to be alike, is generally acknowledged to be the masterpiece of early seventeenth-century books of plant engravings. The woodcuts in the works of Brunfels, Fuchs and Mattioli reached the high-water mark of woodcut botanic illustration, but, as Mr. Savage has emphasized, they lacked the subtle effects of atmosphere. This a copperplate engraver as skilled as Crispin de Pass achieved with brilliant success. For three centuries his book, which is really a florilegium, has been a source of delight to garden lovers. The year after its publication in Latin the *Hortus Floridus* was "faithfully and truly translated out of the Netherlandish Originall into English." The *Hortus Floridus* contains Crispin de Pass's best work. The Tulip plates are exquisite and particularly interesting owing to the fact that Tulips had only recently been introduced into Europe. Apart from the Tulips many of the engravings are of flowers which are now established favourites, but which had only been introduced during the latter part of the sixteenth and early years of the seventeenth century. De l'Escluse, to whom Tulip lovers were so indebted, was also largely responsible for the introduction of the *Auricula* into the gardens of western Europe. The "Spring Garden" which forms the frontispiece of the book is one of the most charming illustrations of gardens of the period which have come down to us. It depicts a formal garden surrounded by a "wall herber," an entrance in the foreground through a wooden gateway, the beds planted with the favourite spring flowers

Strabi Fulbensis mo

nachi Poete suauissimi. quondā Rabani
 Moni subditio Hortulus nuper apud Roduicos in S. Galli monasterio
 repertus. qui Carminibus degantia tam est delectabilis. q̄ doctrine cognoscen-
 derum quarundam barbarum varietate vultu. Ho S:ymabā Hobotem.



¶ Item Psalmus. 41. Sicut ceruus desiderat r̄. et Psalmus. 123. Re-
 date pueri r̄. per Venerabilem Beati. Ioh. Verico decantem.



FIG. 116.—TITLE-PAGE FROM HORTULUS, BY WALAFRED STRABO.

[To face p. 334.]

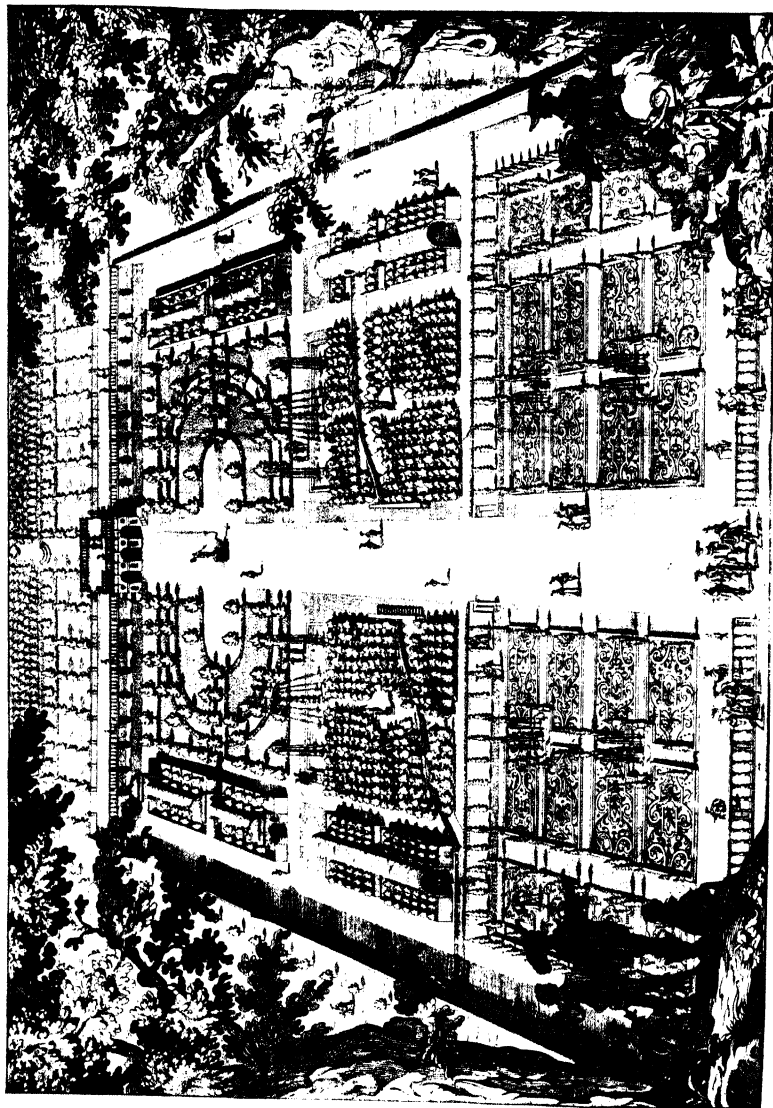


FIG. 117.—PLAN OF WILTON GARDEN, FROM WILTON GARDEN, BY ISAAC DE CAUS.

of the period—Tulips, Hyacinths, Crown imperials, etc. A lady in a ruff is picking tulips, watched by a man leaning over the balustrade. Two other valuable Flemish books are the rare first edition of Orta's *Aromatum et simplicium* (1567) and Weinmann's *Taalryk Register* (1736–48). The plates in the latter, by the Augsburg painters Seuter, Ridinger and Hard, are some of the earliest specimens of colour printing and remarkable for their beauty.

ENGLISH WORKS.

The collection of English herbals and gardening books is particularly fine, for it includes nearly every notable work published during the sixteenth, seventeenth, eighteenth and early nineteenth centuries, many of them excessively rare. Amongst the most important of the sixteenth-century books is one of the few known copies of the second edition of Gerard's *Catalogue* (the only known copy of the first edition is in the British Museum), a copy of the *Secretes* of the Reverende Mayster Alexis of Piemont (1539), and *The newe Jewell of Health* (1576), by George Baker, "chirurgian" to Queen Elizabeth. The two last named are amongst the rarest Elizabethan books of plant interest. There are also copies of Reynolde Scot's *Perfite Platform of a Hoppe Garden* (1578); the first edition of Leonard Mascall's *Booke of the arte and maner* (1572), also the second edition; the first edition of Langham's *Garden of Health* (1579); Pena and Lobel's *Stirpium Adversaria Nova* (1570–71). Perfect copies of this first edition of the last named are very rare, as copies usually lack the dedication to Queen Elizabeth, or one or more of the inserted woodcuts. The copy of Lyte's translation of Dodoens' *Herbal* (1578) is one of the few known copies of the first issue of the first edition, *i.e.* before the word "my" was corrected on the title-page.

One of the finest of the sixteenth-century treasures is a copy of Turner's *Herbal* (1551) with the rare title-page and the woodcut border unshaved. William Turner, "the Father of English botany," was the first Englishman who studied plants scientifically. He was a native of Morpeth, Northumberland, and his father is supposed to have been a tanner. He entered what is now Pembroke College, Cambridge (then Marie Valence Hall), under the patronage of Thomas, Lord Wentworth. At Cambridge he was intimate with Nicholas Ridley (afterwards Bishop of London), who initiated him into the mysteries not merely of Greek but also of tennis and archery. Turner travelled widely in Italy, Germany and Holland, and at Bologna he studied botany under Luca Ghini, the founder of the botanic garden in that city. Turner subsequently became chaplain to the Duke of Somerset, the Lord Protector (to whom he dedicated the first part of his *Herbal*), and it is more than probable that he was in charge of the Duke's garden at Sion House. *Libellus de re herbaria novus* (1538) Turner's first botanical work, is peculiarly interesting, because it is the first book in which localities of native British plants are given. Of the

reprint of Turner's *Libellus* published in 1877 there are only seven known copies with the life of the author by B. D. Jackson. One of them is in this library. Turner's *Herbal* is the only original botanical work written by an Englishman during the sixteenth century. Nearly all the illustrations in this book are reproductions of the exquisite drawings in Fuchs's herbals. They are from the octavo edition of *De Historia stirpium* (1545) and *Neue Kreuterbuch* (1543). Nearly all the illustrations in the most notable Flemish, English and Swiss herbals were printed from the actual wood blocks or copied from the illustrations in Fuchs's works. Over 400 of Fuchs's blocks were used in the complete edition of Turner's *Herbal*, and of the rest some are copied from the smaller figures in Matthioli's *Commentary* and a few were specially drawn and cut for the author. A feature of Turner's *Herbal* are the references to the north of England, where the author spent his boyhood. Lyte's *Herbal* (like the third and complete edition of Turner's *Herbal*) is dedicated to Queen Elizabeth, the preface being dated from "my poore house at Lyte's carie within your Majestie's Countie of Somerset the first day of Januarie MDLXXVIII." Lyte translated the French version of Dodoens' *Kruydeboek* by de l'Escluse, and in the British Museum there is Lyte's copy of the French original with the quaint inscription on the title-page: "Henry Lyte taught me to speake Englishe." The beautiful illustrations in Lyte's Dodoens are mostly from the same blocks as those in the octavo edition (1545) of Fuchs's *De Historia stirpium*. Dodoens evidently took a keen interest in the publication of Lyte's translation, for the illustrations which are not from Fuchs's blocks were evidently (according to the prefatory verses) sent by Dodoens.

There are also fine copies both of the 1597 and 1633 editions of Gerard's *Herbal*. Gerard has earned much condemnation from the critics both of his own and modern times for using Dr. Priest's translation of Dodoens' *Pemptades* without acknowledgment, but for three centuries his book has retained the affection of English-speaking people the world over. He used Dodoens' *Herbal*, but it is Gerard's own additions which make the charm of the book. He gives so much contemporary folk-lore, so many old English names of flowers and such charming accounts of the localities where various plants grew wild in England, particularly in and about London, that to read his volume is to be translated, with a delightful companion, to the country lanes near Holborn, Gray's Inn, Piccadilly, Highgate, Islington, Hampstead, Bermondsey, and the villages of Knightsbridge and Fulham. Of Gerard's early life we know little, beyond the fact that he probably studied medicine and, in his *Herbal*, he speaks of having travelled to Moscow, Denmark, Sweden and Poland. It is possible that he went as a ship's surgeon. After serving his apprenticeship, Gerard was admitted to the freedom of the Barber-Surgeons' Company. Before 1577 he must have been settled in London, for in his *Herbal* he states that for twenty years he had supervised Lord Burleigh's gardens in the Strand and at Theobalds in Hertfordshire. His own garden was

probably on the slope of the hill between Ely Place and the Fleet Hill. It is at least probable that Shakespeare visited Gerard's garden. They were near neighbours when Shakespeare lived in Mountjoy's house, 1598-1604. This house was at the corner of what is now Monkwell (then Mugswell) Street and Silver Street, almost opposite the Barber-Surgeons' Hall. It is indeed scarcely likely that Shakespeare, whose own works are so full of plant-lore, would have failed to visit the garden of the most noted herbarist of the day. In 1598 and again in 1607 Gerard was appointed examiner of candidates for admission to the freedom of the Barber-Surgeons' Company. A few years before he died, Anne of Denmark (James I's Queen) granted him the lease of a garden, two acres in extent, east of Somerset House for four pence a year. He died in February 1611-12, and was buried in St. Andrew's Church, Holborn. The best edition of Gerard's *Herbal* is the enlarged edition by Thomas Johnson, the great botanist, who lost his life in the Royalist cause at the siege of Basing. A copy of Johnson's first edition is in the library.

The earliest gardening book printed in the English language is Thomas Hyll's *A Most Briefe and pleasant treatise* (1563). The only known copy of this diminutive volume is in the British Museum. All the subsequent editions were entitled *The profittable arte of gardening*, and early editions of these are now very scarce. The copy of the 1579 edition in the Nymans Library is in the original tooled calf. Hyll's later and better book, *The Gardener's Labyrinth*, was completed by Henry Dethicke and dedicated to William Cecil, Lord Burleigh, Lord High Treasurer. Hyll also had a share in Baker's *Newe Jewell of Health*, for Baker states that "Thomas Hyll dyd also take paynes in this work, but before it could be brought to perfection God tooke him to his mercie."

One of the rarest Elizabethan books of garden interest is Sir Hugh Platt's dainty little volume, *Delights for Ladies*, every page of which is surrounded with a woodcut border of conventional designs, many of them with the Tudor rose, the fleur-de-lys of France, and E. R. (the Queen's initials). The copy in this library belonged to James I, and is stamped with the royal arms.

Amongst the most important seventeenth-century volumes are a first edition of Parkinson's *Paradisus* (1629), Isaac de Caus's *Wilton Garden* (fig. 117), of which there are only two known copies, the very rare first edition of Austen's *Treatise of Fruit Trees* (1653) and Cole's *Adam in Eden* (1657), the first edition of Tradescant's *Musaeum Tradescantianum* (1656), the first edition of Lovell's *Παμβοτανολόγια* (1659), and the first edition of John Evelyn's *The French Gardiner* (1658). There is no copy of this edition in the British Museum, South Kensington, Kew or Linnean Society's libraries. The French edition was published in 1651, the author's name being given as R.D.C.D.V.B.D.N. These initials reversed are supposed to stand for Nicolas de Bonnefons, Valet de Chambre du Roi. There are also copies of the first edition of Evelyn's *Sylva* (1664), Stephen Blake's *Compleat Gardener's*

Practice, the first edition of Leonard Meager's *English Gardener* (1670), bound in the original calf, and the first edition of his *New Art of Gardening*, and Robert Morison's *Plantarum Umbelliferarum*, Oxford, 1672. The last named is the first monograph devoted exclusively to a single large natural order. J. Blagrove's *Epitome of the Art of Husbandry* (1685) is very rare. I think it must be the book ascribed by Johnson to "Samuel Blagrove as some say Billingsly." There are also copies of the first edition of Grew's *Anatomy of Vegetables* (1672) (afterwards reprinted as part of Grew's *Anatomy of Plants*), also the first edition of *The Anatomy of Plants*. Grew is said to have been the first to observe the existence of sex in plants. Paolo Bocconi's *Icones et Descriptiones Rariorum Plantarum Sicilae*, etc., Oxford, 1674, of which there is a copy, was one of Robert Morison's first publications after his Oxford appointment. Morison prefixed a dedication to Mr. Halton in which he maintained that ferns possess both flowers and seeds. Other seventeenth-century treasures are the rare second edition of *Choice and Experimented Receipts*, by Sir Kenelm Digby (1675), in the original calf, the first edition of Cotton's *Planter's Manual* (1675), the 1683 edition of Samuel Gilbert's *Florist's Vade Mecum*, containing the author's portrait, and the first edition of John Reid's *Scots Gard'ner* (1683), the first book on Scottish gardening.

Of these books the *Paradisus* is undoubtedly the most familiar to the majority of people. Parkinson seems to have been a singularly devout man, and though we know little of his life one learns much of his character from the beautiful preface to his *Paradisus*. In the dedication to Queen Henrietta Maria he truly describes this book as a "Speaking Garden," and no other volume gives us so vivid a picture of the tranquil, spacious gardens of those days. In his *Theatrum Botanicum* (dedicated to Charles I) he incorporated nearly all Bauhin's *Pinax*, besides de l'Obel's unfinished work already mentioned. He originally intended to call this volume "A Garden of Simples." There is a pathetic passage in the preface, from which one gathers that he was a childless man, and, as his beautiful books testify, he seems to have lavished all his love and tenderness on his flowers. Parkinson's *Paradisus* was written for the owners of large gardens, but the manuals for the owners of small gardens were the books by William Lawson, the Izaak Walton of gardening writers and the author of the first book in the English language written for women gardeners. There are several copies of his *New Orchard and Garden and Countie Housewife's Garden* in this library (also the No. 1 copy of the reprint published in 1927). William Lawson was a Yorkshireman, and his book contains an attractive pictorial plan of a terraced garden, the earliest plan of a north-country garden that has come down to us. Lawson states that he laboured "forty and eight years" before writing his books, and with characteristic humility he says that he wrote "not daring to hide the least talent given me of my Lord and Master in Heaven." Unlike Hyll and other early garden writers, who culled largely from the classical authorities, Lawson's works are entirely original and

he writes as only an old man could write after a lifetime's companionship with flowers, trees, birds and bees. Nothing more delightful on the joys of a garden has ever been written than the seventeenth chapter of his book. Lawson, too, is the only early writer who devotes a chapter to the gardener, and a delightful chapter it is. His *Countrie Housewife's Garden* gives a vivid picture of the housewife's garden, full of the old-fashioned flowers and fragrant herbs. He gives the sage advice that if the maids help their mistress in the garden "I advise the Mistress either to be present her self or to teach her maids to know herbs from weeds." The *Countrie Housewife's Garden* concludes with a treatise on bees, "for I will not account her any of my good House-wives that wanteth either Bees or skilfulness about them."

Isaac de Caus's *Wilton Garden* contains the plan of the garden described by Evelyn as "heretofore esteemed the noblest in England." The plan (fig. 117) shows first a series of plots "embroidered" with flowers, four elaborate fountains, and at the further end a terrace; in the second garden the river Nader flowing through woods and groves, on either side tunnelled arbours 300 feet long, this garden divided from the third by ponds with fountains and in the third garden a vast lawn planted with cherry trees overlooked by a terrace. The copy of this volume in the Nymans Library belonged formerly to Horace Walpole. Austen's best-known book, *A Treatise of Fruit Trees*, was written with the avowed object of encouraging fruit-growing in England, and the second part of the volume, *The Spiritual Use of an Orchard*, is curiously interesting from the light it sheds on this seventeenth-century Oxford nurseryman's mind. He had evidently lived through a time of great spiritual distress, a time he describes as "walking in darkness seeing neither Sunne nor Starres for many months together," and it was his earnest desire that fruit trees should speak to others as they had to him of the love and wisdom of God.

One of the most interesting of the early eighteenth-century books is Joannis Martyn's *Historium Plantarum* (1728), one of the earliest examples of colour printing. It is a large folio volume, containing some fifty beautiful illustrations. Later eighteenth-century books are a complete set of Curtis's *Botanical Magazine*, Curtis's *Flora Londinensis*, the first edition of Sowerby's *English Botany* (1790-1814), and Miss Lawrence's magnificent *Roses*. Amongst the smaller rare books are John Ray's *Synopsis Methodica Stirpium Britannicarum* (1724), Batty Langley's *New Principles of Gardening*, 1728 (the author's best work), *Catalogus Plantarum*, by "A Society of Gardeners" (1730), Elizabeth Blackwell's fine *Herbal* and the German translation, that very rare slender volume *A Particular Account of the Emperor's Gardens near Pekin*, by F. Attiret, translated by Sir Harry Beaumont (1752), *The Compleat Florist* and *The Complete Florist*. The two last mentioned were published the same year, the former being extremely rare and the latter not so rare, though first editions of it are scarce. There are also copies of two interesting eighteenth-century gardening manuals—Cowell's *Curious and profitable*

Gardener (1730) and Anthony Powell's Royal Gardener. Of the last mentioned there is no copy in the British Museum or South Kensington libraries. The author was gardener to George II.

The nineteenth-century collection includes H. C. Andrews' *Roses* and his *Ericas*. Of the former there are very few complete copies known (complete copies contain 129 plates and the frontispiece). Edwards' *Botanical Register*, 1815-47 (complete copies with the 2,702 coloured plates are extremely rare). The copy of Loddiges' *Botanical Cabinet*, 1817-33 (a valuable series of 20 volumes with 2,000 coloured plates), is of particular interest as it is one of the very few known copies still in the original wrappers. The volumes are contained in boxes which look like books. There are also Sweet's *British Flower Garden*, his *Geraniaceae*, *Cistinae*, *Florist Guide* and *Hothouse and Greenhouse Manual*, Maund's *Botanic Garden* (1825-50), Wallich's *Plantae Asiaticae rariores* (1830-32), Paxton's *Magazine of Botany* (1834-49) and *Salicetum Woburnense*, 1829. Only 50 copies of this book by the Duke of Bedford were published and this is one of his presentation copies. Later books include Loudon's *Arboretum et Fruticetum Britannicum* (1854), Hogg's *Herefordshire Pomona* (1876-85), and one of the few copies of Elwes' *Monograph of the Genus Lilium* (1880). Of the twentieth-century books there is only space to mention Clinton Baker's *Illustrations of Conifers* (1909-13), Miss Willmott's *Genus Rosa*, and Elwes and Henry's *Trees of Great Britain and Ireland* (1906-13).

SWISS WORKS.

Amongst the early Swiss volumes are all Gesner's works. There are fine copies of his *Catalogus Plantarum* (1542) and *De Stirpium* (1557), and his *Opera Botanica*, published by Trew in 1757, is in the original boards. Konrad Gesner was one of the most remarkable botanists of the sixteenth century, but he never received the recognition that was his due in his lifetime, for his greatest work was not made known to the public till about a hundred and fifty years after his death. He was born in very humble circumstances, the son of a furrier, and after a brief period of student life he became a teacher and finally secured the professorship of Philosophy and then that of Natural History at Zurich. He died of plague before his fiftieth year, and his writings published during his lifetime were of minor importance. His chief work was the collecting of almost 1,500 plates for what was intended to be a great botanical work, a companion volume to his *Historia Animalium*. Caspar Wolf, to whom he bequeathed his collection, published some in Simler's *Vita Conradi Gesneri*, but being unable to do anything further, he sold them to Camerarius the younger, who used some of them. In the eighteenth century Christoph Jacob Trew published the whole. Though nothing of Gesner's MS. is extant, we know from his letters that he was a scientific and accurate observer, in many ways far in advance of his time.

Jean Bauhin, whom, although so much his junior, even Gesner did

not disdain to consult, was French by birth and took refuge in Switzerland after he became a Protestant. After studying at Basle, he became a pupil of Fuchs, and after a period of travel he came to Lyons, where Jean d'Aléchamps engaged him to work on his *Histoire des Plantes*. Bauhin, however, on account of his faith, was obliged to return to Switzerland. He died before his great book, *Historia Plantarum universalis*, was finished. It was completed by his son-in-law, Cherler. There is in the library a fine copy of this book, also of Caspar Bauhin's most important work, *Pinax Theatri Botanici*, and his other works. It is a thousand pities, as Mrs. Arber emphasized, that the Bauhin brothers did not work together, for they worked on the same lines. Caspar Bauhin's magnificent book contains the first authoritative concordance of plant names and deals with about 6,000 plants. Another valuable Swiss work is Macer Floridus *De Herbarum Virtutibus*, Basle, H. Petri, 1559. This is a rare edition of this herbal usually attributed to Odo of Meung. D. Loris' *Le Thresor des Parterres*, 1629, is interesting, for the text is given in Latin, French, German and English. Chabrée's *Omnium stirpium sciographia et icones*, Geneva, 1667, is a very rare book. Chabrée, a native of Geneva, wrote it in imitation of Bauhin's *History of Plants*. Chabrée discovered several plants, including *Selinium Chabraei*.

ITALIAN WORKS.

Amongst the early books is a copy of Macri *Philosophi De Virtutibus Herbarum*, 1508. In a manuscript note at the end of the book the owner, "Hannibal Camillus Corrigiensis," relates that he bought it for 3 shillings on 24 January 1520. Also Paladio *dignissimo et antiquo scrittore della agricultura tradutta volgar*, Venice, 1538, this being the first edition of the Italian version; J. Costoens' *Laudensis*, Turin (1578); Andrea Caesalpinus' *De plantis libri XVI*, Florence, 1583; Marco Bussato's *Giardino d'Agricoltura*, Venice, 1599 (in the original paper binding, and both the 1612 and 1781 editions are in old vellum). There are seven of Mattioli's works, the first edition of his complete works, *Opera quae extant omnia* (1598), being in old calf gilt. Pierandrea Mattioli, who was born at Siena in 1501, was the son of a Venetian doctor. He became a doctor himself and was successively physician to the Archduke Ferdinand and the Emperor Maximilian II. This library contains four copies of his greatest work, the *Commentaries on Dioscorides*, which went through numerous editions and was translated into many languages. Of Durante's works there are his *Herbario Nuovo* (1602 and 1667 editions) and *Il Tesoro della Sanita* (1593); and of Fabio Colonna's, the first edition of his *Φυτοβασανος* (1592) and a copy of the 1744 edition bound in the old figured paper. This book contains the first botanical illustrations made from etchings on copper. There is also a copy of his *Minus Cognitato*, 1616 (the first edition of the complete book and the author's most important work). Copies of Prosper Alpinus' works include the first edition, bound in the original vellum, of his *De Balsamo Dialogus* (Venice, 1591), the first edition in old

calf of *De Plantis Aegypti*, and *De Plantis exoticis* (Venice, 1629). Prosper Alpini, who ultimately became Professor of Botany at Padua, was a doctor and he accompanied the Venetian consul Giorgio Emo to Egypt. His book contains the first description of the coffee plant given by an European writer.

It is a curious fact that, although even before 1600 some two hundred Italian books on subjects ranging from theology to cookery were translated into English and published, no Italian gardening book was translated in Elizabethan or Stuart times. Yet Italian influence was strong in the sixteenth and early seventeenth centuries, and every young man of any standing completed his education by going to Italy. The splendours of the Italian gardens of this period are perhaps best represented in Falda's grand book *Li Giardini di Roma*. There is a perfect copy in this library.

FRENCH WORKS.

The French collection is very fine. Amongst the early works are *De Natura Stirpium* (1536), by Jean Ruel; de l'Escluse's translation of Dodoens' *Herbal*, *Commentaires de M. Pierre André Matthioli sur les six livres de Ped. Dioscoridi*—1572 (the first edition in folio of the French translation); and Paul Renaulme's *Specimen Historiae Plantarum* (Paris, 1611), a very rare and most interesting book. The author planned a new system of botany which he never completed, this being the only example of it. According to the *Dictionnaire de Biographie Universelle*, Renaulme anticipated Linnaeus' work by over a century. It is the second known book with copper-plate illustrations. Franeau's *Jardin d'Hyver* . . . 1616 is another interesting and valuable book. It is a companion volume to the *Hortus Floridus* of Crispin de Pass and contains 50 beautiful copper-plate engravings of cultivated flowers. There is also the second edition (1623) of Vallet's *Le Jardin du Roy Très Christien Loys XIII Roy de France et de Navarre*. The first edition, published in 1608, contained only 73 plates and bore the name of Henry IV on the title-page. For the second edition the title-page was re-engraved in order to substitute the name of Louis XIII. For the third edition the title-page was again re-engraved to substitute the name of Louis XIV. The library contains the first and second editions of d'Aléchamps' *Historia plantarum Lugdunensis*, written with the help of both Jean Bauhin and Jean Desmoulins (the copy of the first edition has the arms of J. A. de Thou on the cover); d'Aléchamps' and Desmoulins' *Histoire générale des plantes* . . . Lyons, 1653, the most complete edition of this herbal, containing over 2,700 woodcuts, with few exceptions the plants those of Provence, Languedoc and Spain; and Morin's *Remarques Necessaires pour la culture des fleurs* (1658), the first edition (1694) of Pomet's *Histoire générale des Drogues*, and Pierre Magnol's *Hortus regius Monspeliensis* (1697). Magnol was director of the Botanic Garden of Montpellier. The genus *Magnolia* was named after him. Another interesting book



FIG. 118.—HEIDELBERG GARDEN, BY ISAAC DE CAUS.

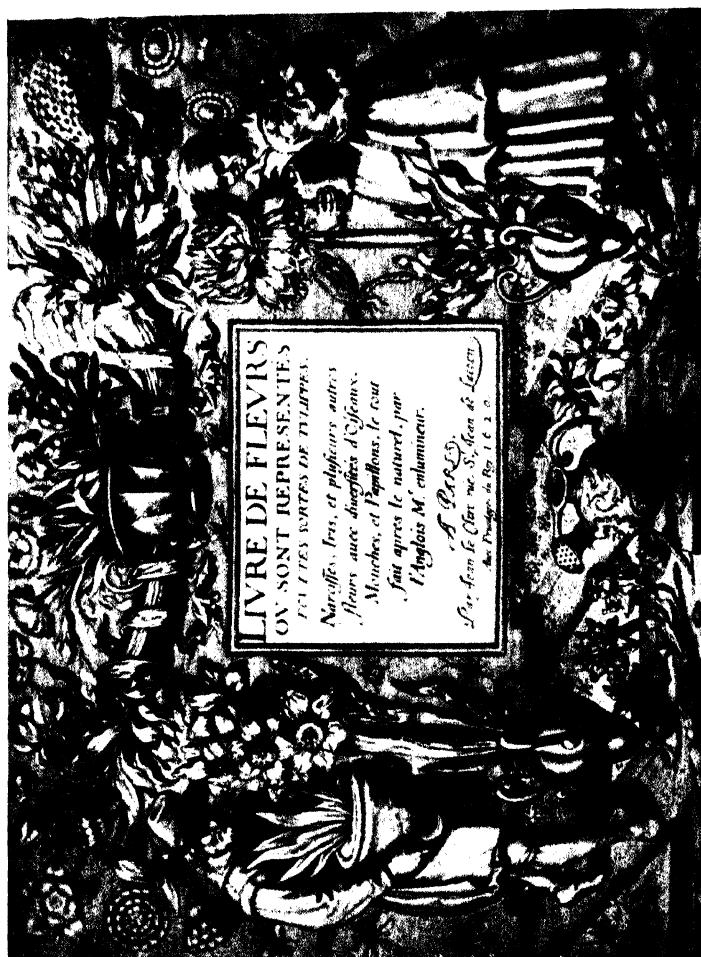


FIG. 119.—TITLE-PAGE FROM LIVRE DE FLEURS, 1020.

[To face p. 343.]

is the rare edition printed at Lyons of Nicholas de Bonnefons' *Le Jardin Francois* (1658). Amongst the most delightful of the lesser seventeenth-century French books are the little *Tulip* and *Auricula* treatises. There are copies of all the rarest in this library, notably the first edition of *Le Floriste Francois . . . Caen, 1654*, Jean Laurent's *Abrégé pour les Arbres Nains . . . asusi un Traité général et singulier pour la culture de toutes sortes de Fleurs, 1675* (not in Pritzel), and *Connoissance et Culture Parfaite des Belles Fleurs . . . 1696*.

One of the most notable eighteenth-century books is Thiéry de Menonville's *Traité de la Culture du Nopal et de l'éducation de la Cochinille dans les colonies Françaises de l'Amérique . . . Au Cap Français . . . 1787*. Only 150 copies of this book were printed (at San Domingo), nearly all the cost being subscribed in the colony. San Domingo was founded by Bartholomew Columbus in 1496 and was the first European town in the New World. The author was the King of France's botanist in San Domingo and was sent secretly to Mexico to secure the cochineal insect, of which the export was forbidden by the Spanish government. The insects he secured died during the crossing, but some years later a colonial acclimatized the wild cochineal on his own property. With this the first flag presented to the Convention was dyed. Another interesting eighteenth-century book is Plumier's *Description des Plantes de l'Amerique, 1713*. Plumier was twice sent to America by Louis XIV to study the plants and natural history of that country. This book contains 108 engravings of American plants. There are also copies of that rare book Garidel's *Histoire des plantes qui naissent aux environs d'Aix . . . Aix, 1715*; and Duhamel du Monceau's *Traité des Arbres fruitiers . . . 1768*. The latter is one of the rarest books on fruits. The finest edition was that brought out by Poiteau and Turpin in 1835.

The most magnificent of the French treasures, however, are the Redouté books: the first edition of *Les Liliacées, 1805*; *Jardin de la Malmaison, 1803*, a work dedicated to Madame Bonaparte, and issued a year later with a dedication to Josephine as Empress, with a second volume title-page dated 1804, and a later edition appeared in 1813; Bonpland's *Description des Plantes rares cultivées à Malmaison et à Navarre . . . 1813* (with 64 plates by Redouté), a very rare Redouté book, for only a limited number were printed; his *Plantes grasses (1830)*; *Botanique de Rousseau (1805)*; and the first edition of 1817-24 of his *Roses*. In addition to these there are Jacquin's superb works, *Florae Austriacae, Vienna, 1773*, and *Miscellanea Austriaca, 1778*.

To a collector the true value of a collection such as this lies in the intrinsic beauty of the books and the wide range of interests they afford not only to gardeners, botanists and artists but also to ethnologists, folk-lorists, philologists etc. Indeed, the literature of few other subjects has so wide an appeal.

A BOTANICAL STUDY OF ROSE STOCKS.*

By JESSIE FERGUSON, B.Sc. (Hort.) (Department of Agricultural Botany, The University, Reading).

INTRODUCTION.

ROSES are more widely grown and universally appreciated than almost any other garden flower. For centuries they have occupied this position of popularity, not only in Britain, but in every part of the world of which we have gardening records.

In England to-day several hundred varieties of Roses are grown, and of these only a very small minority are on their own roots, the rest being budded or grafted on Rose stocks.

Gardeners are practically unanimous in regard to the advisability of growing most Roses on stocks, but they are at considerable variance in deciding which stocks to use for the purpose. The stocks employed are either native Roses or exotic varieties which grow well here.

The majority of cultivated Roses grown on stocks are found to have greater vigour, produce many more flowers, and live for a much longer period than when grown on their own roots.

For rapid propagation of new varieties of Roses, budding or grafting on stocks is indispensable. From a single Rose bush a dozen buds can easily be obtained, and each of these budded on a stock will produce a Rose bush the following year.

In the same way stocks are used for testing new varieties of Roses raised from seed. It is said that one or two buds can be taken from a one-year-old seedling, and being inserted on a stock will flower the following year, whereas the seedling itself may not do so until three years old or later. The first flowers of a seedling are generally imperfect, and the plant is liable to die after flowering.

HISTORY.

Of the early history of Roses little is known. It is probable that they were grown in the celebrated gardens of Babylon about 1250 B.C., and it is known that they were cultivated by the Jews during the reign of Solomon about 1000 B.C.

The Ancient Greeks held the flower sacred to Aphrodite, and Roses were to be bought in Athens market. About 300 B.C. THEOPHRASTUS † wrote at considerable length concerning Roses. He describes how the people of Philippi went out on to Mount Pangaeus

* This article is part of a thesis presented for the M.Sc. (Hort. Bot.) Degree, University of Reading.

† THEOPHRASTUS (371 B.C.-286 B.C.). Enquiry into Plants (*Trans.* by Sir A. Hort).

to collect the wild Roses and brought them back to grow in their gardens ; how they raised them from seed, but germination being slow, they found it better to make cuttings of the stems and plant them ; and how the bushes were burnt or cut over to prevent them from making wood rather than flowers.

VIRGIL refers to the cultivation of the Rose in Rome in the Rose Gardens of Paestum, but although he describes budding and grafting in connexion with vines and other plants, he makes no mention of the use of these methods of propagation for Roses.

In *Naturalis Historiae*, written some time between A.D. 23 and A.D. 79, PLINY briefly describes the methods of propagating Roses from seed, which he observes was such a slow process that it was more usual to propagate them from suckers, or by grafting ; but he gives no account of the method of grafting Roses.

Throughout the Middle Ages Roses were undoubtedly grown, but until the sixteenth and seventeenth centuries there are no definite records. The early English herbalists record several different kinds of Roses. In his *Herbal*, GERARD (1597) includes among his descriptions accounts and woodcuts of some of our native species, such as *Rosa canina* L. (which he calls *Canina inodora*), *R. rubiginosa* L. (which he calls *Sylvestris odora*), and *R. pimpinellifolia* L., but he makes no attempt to describe their cultivation.

JOHN PARKINSON, in *Paradisi in Sole* (1629), shows that he was a true gardener, combining a comparatively extensive knowledge of plants with a thorough understanding of their cultivation. He describes twenty-four distinct species of Roses which apparently he grew on their own roots, and as far as their identity can be ascertained they were all Roses which do well when so grown. However, in Chapter IX he inserts a note to the effect that some people advise grafting on Broom or Barberry to obtain a yellow Rose, but he did not accept this as being true.

About this time grafting and budding became very popular for different kinds of fruit trees, but as yet nobody had seriously applied themselves to this method of Rose growing. In *The Countryman's Recreation or the Art of Planting, Grafting and Gardening* of 1640, there is an amusing piece of advice regarding the production of ever-green Roses by grafting them on Holly.

By 1655 progress was being made, and Sir H. PLAT * asserts : " The muske and yellow rose and all those double and centiple roses may be budded on the sweet briar."

Twenty-one years later the best stocks were given by REA † as :

Damask Rose (*R. damascena* Mill.).

White Rose (*R. alba* Linn.).

Franckfort Rose (*R. francofurtana* Muench).

Eglantine (*R. rubiginosa* Linn.).

* PLAT, Sir HUGH. *The Garden of Eden*. 1655.

† REA, J. *Flora ; seu de florum cultura*. 1676.

Still they were only used as a means of producing Roses on their own roots, advice being given to bud low, so that the bud break might be laid in the earth to root, giving a natural tree, "one of which is more worth than three that are budded, for that every sucker that comes from them will be of the same kind."

Apparently at this time the Sweet Brier (*R. rubiginosa*) was the most generally used stock, quite possibly with the hope of transmitting some of its fragrance to the scion. In 1688 J. W. WORLIDGE, in *The Art of Gardening*,* stated that the more excellent sorts of Roses succeeded very well when grafted on the Sweet Brier.

LEONARD MEAGER, in *The English Gardener* (1683), introduced a new aspect of budding, using it to test new varieties quickly. He does not seem to have had any very special preferences regarding stocks, as he says that the White, Damask, and other Roses might be used for this purpose.

For the next fifty years or so gardeners chose their stocks rather indiscriminately, but about the middle of the eighteenth century for several years the Franckfort Rose was considerably used, even though there seems to have been a return to the custom of growing Roses on their own roots. In the *Compleat Body of Gardening* the Franckfort Rose is described as being preferable to any other kind of stock, because it produced fine clean shoots which united with the buds very easily; but the author still hankered after a Rose on its own roots, as he goes on to say that "the bud is pegged down, puts out its own roots and reproduces itself by suckers."

In 1763 the same attitude was taken up by WHEELER,† who states that budding was seldom practised, being only used for rare Roses with little vigour. He mentions the Franckfort Rose as the best stock, and the same Rose is recommended by DICKS in the *New Gardener's Dictionary* (1769).

Little advancement had been made up to the beginning of the nineteenth century, and the best method of propagation was held to be layering, budding only being practised "for peculiar sorts which don't grow well on their own roots, or where a person is willing to have more than one sort on the same plant." The Franckfort Rose was found to be a vigorous grower, and was used for Yellow and Austrian Roses.

In 1816 ANTHONY CARLISLE wrote a thoughtful article in the *Transactions of the Horticultural Society of London*. He considered that the green cellular tissue of the bark in young branches consisted of the same material as the leaves, and formed a parenchymatous pulp reservoir for the next succession of foliage and fruit. As he found more of this tissue present in the China Rose than in any other, he suggested that this might be the cause of its continuous flowering, and for this reason recommended it as a stock for "yellow, and other difficult flowering roses."

* WORLIDGE, J. *Systema horti-culturæ*. Ed. 3. 1688.

† WHEELER, J. *The Botanist's and Gardener's New Dictionary*. (1763.)

It seems strange that until the time of LOUDON (1824)* no mention had been made of using *Rosa canina* (the common Brier or Dog Rose) as a stock; about this time, however, in Holland the Brier was being used for growing standard Roses. LOUDON recommended budding on "any sort of woody wild rose," and amongst others actually mentions *R. surculosa*—a variety of *R. canina*; apart from standards and rare sorts, he still preferred Roses on their own roots; and he describes the whole process of budding. The stocks were taken, in late autumn, from the woods and copses, and planted in nursery rows. The next spring or summer they were budded, two buds being inserted as a rule, but sometimes more, up to twelve.

At the same time standard Roses became popular in France. M. PRONVILLE of Versailles wrote in the Transactions of the Horticultural Society of London, vol. 5, p. 492 (1824), that grafting was practised on standard wild Roses, or Eglantines. He observed that grafting was advisable, as some of the best varieties of Roses lost their improved colours if grown on their own roots. Further evidence of the use of *R. canina* is given by G. B. VAN MONS in the Transactions, vol. 6, p. 317 (1826). He obtained his original stocks from the woods and hedges, planted them in the nursery and earthened them up to form stool beds.

From the time when *R. canina* was first used until 1834 it was fairly generally accepted as the best stock, but with the introduction of the Manetti stock, for many years its supremacy was challenged. In spite of much investigation, the origin of the Manetti Rose is still doubtful. In 1834 Signor CRIVELLI of Como, attracted by an article in LOUDON'S Gardeners' Magazine, wrote to the editor offering to exchange some seedling Italian Roses for some named new varieties. THOMAS RIVERS accepted the offer and received the Roses in a book-seller's parcel, through Messrs. LONGMAN & Co.

Amongst them were two Roses named *R. indica grandiflora* and *R. indica Manetti* respectively. These were stated to be very similar to each other in habit, but the latter could be propagated from cuttings much more easily than the former. Both were described as hybrid China Roses. Who actually raised *R. indica Manetti* is not clear; some authorities state that it was raised from seed by Signor MANETTI of the Botanic Gardens, Monza, Italy, while others attribute it to Signor CRIVELLI, who is supposed to have named it after Signor MANETTI. In the Gardeners' Chronicle (1883) there is still a third origin given, as a quotation from Revue Horticole, in which M. BERTIN of Versailles recorded that he raised this Rose in 1832 from seed of a Bourbon variety. He observed one seedling to be more vigorous than the rest, and stated that the name Manetti was given to it by M. M. BURDIN of Chambéry. Some years passed before the Rose flowered, but in the meantime cuttings from it were used as stocks. However, as THOMAS RIVERS undoubtedly introduced Manetti into Britain, it

* LOUDON, J. C. An Encyclopaedia of Gardening. Ed. 2, p. 891. 1824.
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seems probable that at least the greater part of the Manetti stocks of this country are of Italian origin.

By about 1850 Manetti had been fairly well circulated, and for the next thirty years or so the literature relating to Rose stocks is largely monopolized by the Manetti *versus* Canina controversy. THOMAS RIVERS, finding that Manetti proved an excellent stock in his nursery, and having himself introduced it into England, eventually proclaimed it as the best universal stock. On the other hand, WILLIAM PAUL remained staunchly in favour of *R. canina*, even though he admitted that Manetti had many points to recommend it. Apparently the majority of people who had grown Roses on *R. canina* and Manetti felt it incumbent upon them to write to the Gardeners' Chronicle or The Florist, stating their own views, few of them with any consideration of soil, situation, climate, or varieties used as scions, and still fewer having submitted the stocks to any thorough or prolonged test.

The points of advantage in using Manetti are given as follows :

- (1) It is readily propagated.
- (2) It is quickly established.
- (3) Budding is easy, as the bark rises easily.
- (4) It needs less water or manure than Roses on their own roots or on Brier, and can be grown on very poor light land usually considered unfit for Roses, at the same time doing well on stiff land if it is not too wet.
- (5) It is an earlier, more abundant, more continuous grower than any other stock.
- (6) If diseased, it often recovers when placed under a north wall and lightly covered with soil.
- (7) The wood of the scion budded on this stock ripens well.
- (8) It grows every year with the scion.
- (9) Suckers arise from the stem only, not from the root, and RIVERS says that these are soon overpowered by the scion.
- (10) Blooms of Roses on this stock are large.
- (11) It withstands the bad effect of town smoke better than the Brier.
- (12) It is an excellent pot stock, producing a mass of fibrous roots.

With all these excellent characters attributed to Manetti as a stock, it is not surprising that for several years it was widely used and generally appreciated. WILLIAM PAUL was the first to question its desirability, and in 1850, in a letter to the Gardeners' Chronicle, he points out that on his soil Manetti produces buds so rapidly that it may smother the scion. However, as long as Hybrid Perpetuals and Bourbon Roses remained popular, Manetti was a favourite stock, and undoubtedly it suited these varieties.

The rise of Hybrid Tea and Pernetiana Roses from 1876 onwards marked the decline in popularity of Manetti, as not even its staunchest supporters could maintain that it was satisfactory as a stock for these

two classes. The chief point against it is that scions grown on it prove to be short-lived, and to-day practically its only use is as a stock for pot plants where the development and extension of the root are restricted, and on poor sandy soil where its vigour is checked. Since 1834, when Manetti was introduced, *R. canina* had generally remained, if not first in favour, at least second. Reports from many different Rose growers throughout the country show that both cuttings and seedlings proved fairly satisfactory. It was soon found that Brier was useless on very sandy soils. Generally speaking, Brier requires more care than Manetti, and mulching was early adopted as a means of protection against drought and frost. J. MILNE* and W. F. RADCLYFFE† give figures to show the death-rates in winter of Roses on Brier and Manetti respectively. The results are as follows :

W. F. Radclyffe (1860).

" Brier	28 Roses	9 died	2 weak	2 died down to base, but now doing well.
Manetti	137 "	4 "	—	3 died down to base, but now doing well."

J. Milne (1861), after a severe winter.

" Loss on Manetti = 5 per cent.

" " Brier = 75 per cent."

In both cases Roses on Manetti proved more hardy.

Several gardeners recorded Brier as being rather difficult to strike from cuttings, so that it had to be propagated by means of suckers from plants cut back and earthed up to form stool beds.

One other disadvantage of Brier was noted by W. F. RADCLYFFE—namely, that the Roses budded on it require a rest season between the first and second series of blooms, whereas those on Manetti do not.

The reports on Brier as a stock, made by various Rose growers from about 1830 until the present time, show that there has been great variation in the material used. Without many startling successes most types of Brier have proved useful, and where nursery stock has been propagated from the wild Roses of the district, satisfactory results have been almost universal.

Since the introduction of Manetti many varieties of Roses have been tried as stocks. None aroused so much comment as Manetti, but several still remain in use, and it is interesting to follow their history.

Between 1845 and 1855 several different Roses were suggested as stocks, mainly cultivated, named varieties, but none of these has been retained. J. WEBSTER‡ of Eartham recommended the Banksian Rose, which he states gave good results with Hybrid Perpetuals,

* MILNE, J. In letter to Gardeners' Chronicle, 1861, p. 773.

† RADCLYFFE, W. F. *Roses on Manetti*, The Florist, Fruitist, and Garden Miscellany, xii.

‡ WEBSTER, J. *The Banksian Rose a Good Stock*, Gard. Chron., 1845, p. 754.

Bourbons, and China Roses. Later it was recommended for Roses grown on chalk and limestone soils. In the Gardeners' Chronicle for 1850, JOHN SAUL states that "many cultivators take strong, vigorous stocks, such as Crimson Boursault, Celine, etc., and work weak varieties on them." On the whole these proved unsatisfactory, as the scions flourished for a very short time only. From this article and one that appeared in The Florist in 1853, it is learnt that Crimson Boursault proved to be a vigorous grower, easy to work, rather subject to disease, and generally inferior to Manetti. Blush Boursault and other Boursaults tried were so susceptible to mildew that they were considered useless. Celine, a vigorous Hybrid China Rose, was sometimes used for the same classes of Roses as Manetti, but was difficult to propagate, too vigorous, and much inferior to Manetti. Its chief use was as a stock for 'Cloth of Gold,' and several Rose growers recommend its trial. Bourbons, Chinas, Teas, and Noisettes succeeded on 'Duc Decazes,' a vigorous Hybrid Bourbon Rose with firm wood, but it was little used. 'Ornement de Parade,' of which little seems to be known, was sometimes used, but had nothing to recommend it. *Rosa indica* L. was occasionally used for delicate Teas and Chinas, but without much success.

In 1864 *R. cinnamomea* L. is mentioned as being tried, but proved unsatisfactory.

Up to this time nurserymen had tried to bud weak Roses on strong stocks with the idea of endowing the scions with more vigour, but later there was a marked tendency to study the similarity of constitutional habit and growth of both stock and scion. This was a great advance, and Rose growing became more scientific.

'Gloire de Dijon' appeared in the Gardeners' Chronicle as a stock for 'Maréchal Niel.' It is reported as giving shortened growth and more flowers of a deeper colour than stocks previously tried.

'De la Grifferaie' was first mentioned as a stock in 1878. It was described as a vigorous Rose with climbing propensities. One Rose grower reports that he used it very successfully with strong-growing Roses, and it gradually came to be used largely for vigorous climbers. It was found to grow well in sandy soil, and was a success as a pot stock for Teas and China Roses. Although never in the first rank of popularity, it still remains in use.

In 1881 and 1882 there was a rather unexpected tendency for gardeners to revert to growing Roses on their own roots. Probably trials of new stocks had led to many disappointments, and for a time an attempt was made to return to early methods of natural Rose growing. This did not last long, as about 1883 interest in the stock question was again stimulated by the introduction of a new stock, *R. multiflora* Thunb., a native of Japan, usually known to nurserymen as *R. polyantha*.* It has proved to be readily propagated by means of cuttings, and is a vigorous stock with strong growing varieties. At the

* According to Willmott (The Genus *Rosa*, I, p. 24), Sir J. B. HOOKER states that the white, single-flowered plant—the form used as a stock—was first seen in England in 1875.

present time it is extensively used for Polyantha Roses and other strong decorative types.

Two years later *Rosa rugosa*, a native of Japan, was tried as a stock. It was found to have a good fibrous root system, and gradually came into prominence. Although most growers seem to have found that it suckers badly, it has been retained, chiefly as a stock for standard Roses, but is occasionally used for Bush Roses.

The next Rose stock to appear in nursery work came under the name *Rosa laxa*, and was first on sale at Birmingham, having been received from Holland. Some doubt exists as to the identity of this species; in the Gardeners' Chronicle for 1894 it is described as a "briar stock with very spindly and distorted habit of growth, and according to Sweet is a native of America." Several years later, in the same paper, it is described as having been introduced by RETZIUS in 1803, and is given as a native of Siberia. A description of RETZIUS' plant shows that it is not the same species as the *R. laxa* stock. Another writer calls it *R. Froebelii*, a native of Kurdistan. As far as can be ascertained, the Laxa stock used in Britain originated in the nursery of Messrs. FROEBEL of Erben, Zurich, Switzerland. FROEBEL called it *Rosa laxa*. REHDER considers it to be a variety of *R. coriifolia* and has named it *R. coriifolia* var. *Froebelii*.

In recent years several species, which were originally introduced for decorative purposes, have been tried as stocks. These are :

R. moschata floribunda Hort.

R. rubrifolia Vill.

R. odorata Sweet.

'Lippiat Manetti.'

R. setigera Hort.

Rosa moschata, the Musk Rose, was introduced into England from South-West Asia in Elizabethan times, and a variety of it was first used as a stock a year or two ago. It has not been employed for a sufficient length of time to determine whether it will remain in use.

In 1830 *R. rubrifolia*, a native of Southern France and South Austria, was introduced into North America, whence it was first brought to England. For several years it has been used as a stock, but has not become very popular.

R. odorata, a Chinese garden Rose, known in China as 'Fun Jwan Lo,' has only recently been used as a stock in this country, although for several years it has been gaining in popularity in America, especially for Roses grown indoors.

Lippiat Manetti, a decorative pink, semi-double Rose, which is occasionally used as a stock, is said to have arisen as a sport from Manetti.

The *Setigera* stock, whose origin is obscure, must not be confused with *R. setigera* Michx., the North American Prairie Rose. It is of little value as a stock, and its use will probably soon be discontinued.

Since the formation of the National Rose Society, competition in Rose growing has become very keen. In consequence much more

interest has been taken in Rose stocks, as good stocks are essential for the production of choice flowers and satisfactory bushes, but the really perfect stock has not yet been discovered. During the last few years the chief advance made in this direction by leading nurserymen has been the distribution of definite strains of *R. canina*, which ensures greater uniformity.

The table below shows the place of origin of the various strains of *R. canina* used in Britain.

<i>Stock.</i>	<i>Place of Origin.</i>
Brog's	Nursery of Robert Brog, Reichenbach, Germany.
Deegen's	„ „ Max Deegen, Berlin.
Jägerbataillon	„ „ Josef Klinken, Frankenstein, Silesia.
Kokulensky	„ „ Kokulensky, Berlin.
Senff	„ „ Senff, Zerbst, Germany.
Schmidt's Ideal }	„ „ Schmidt, Kostnitz.
„ Special }	

Smit's Brier raised in the nurseries of Messrs. Jac Smit & Co., Naarden, is said to be a cross between *R. rugosa* and *R. canina*.

On the Continent practically the same stocks are used as in Britain. In America one or two more have been added to the list, the chief of these being *R. Fortuneana* Lindl., *R. laevigata* Michx., and a seedling of Vielchenblau (the Blue Rambler), which bears the trade name of I.X.L. This gives a total of about twenty stocks in more or less common use to-day, the following being a sufficiently complete list :

R. canina Linn., Brier stock, including :

Brog's canina,
Deegen's canina,
Jägerbataillon,
Kokulensky's canina,
Senff's canina,
Schmidt's Ideal,
Schmidt's Special.

R. 'De la Grifferaie' Hort.

R. Fortuneana Lindl. (not used in Britain).

I.X.L. (not used in Britain).

R. laxa Froeb., *R. coriifolia* var. *Froebelli* Rehd.

R. laevigata Michx. (the Cherokee Rose) (not used in Britain).

Lippiat Manetti.

R. Manetti Hort. (*R. chinensis* Jacq. var. *Manetti* Dipp.).

R. moschata floribunda Hort.

R. multiflora Thunb., including :

R. grandiflora Hort.
R. multiflora japonica Hort.
R. multiflora polyantha Hort.
R. simplex Hort.
R. polyantha Sieb. and Zucc.

R. odorata Sweet.
R. rubiginosa Linn.
R. rubrifolia Vill.
R. rugosa Thunb.
R. setigera Hort.
Smit's Brier.

COLLECTION, PLANTING AND GENERAL SURVEY.

Stocks were bought from various nurserymen, the largest batch being obtained from Holland, as it was found that few English nurserymen propagate their own stocks in any quantity, by far the greater number purchasing fresh material annually. On arrival the stocks were either planted at once, or heeled in until conditions were suitable for planting. A plot of land (Plot A) was selected at the Agricultural Botanical Gardens, and the stocks were planted in rows 2 feet apart and 1 foot 6 inches asunder in the rows. They were not cut back, those which arrived in the autumn of 1930 being allowed to grow naturally until July 1931. The majority of them were budded, selected plants of each type being left unbudded as specimen stocks for further study and experiments. Those which were received in the autumn of 1931 were planted out similarly for budding in July 1932.

A collection of stocks planted in the nursery at the University Horticultural Station (Plot B) provided further material for investigation.

Plot A is in a rather open position with a slight slope towards the N.N.E. and has moderately good drainage. The top soil is a grey-brown, coarse, sandy, stony loam, slightly alkaline with a small amount of free calcium carbonate present. The subsoil is a light brown coarse, sandy, stony loam with a little free calcium carbonate. In 1929 the ground was given a light dressing of basic slag and kainit (5 slag to 2 kainit), and since then it has received no artificial manures. The plot lay fallow in 1930, and more than half of it in 1931. Any weeds arising were dug in as green manure, but no special crop was grown for this purpose.

Plot B is also in a rather open position with a slight slope towards the south and good drainage. The top soil is a grey-brown sandy loam of a similar but rather coarser texture than that of Plot A, and is neutral, having no free calcium carbonate. The subsoil is the same as in Plot A.

As the stocks arrived a preliminary survey was taken, and throughout the period October 1930 to May 1932 they were regularly examined in the field.

In a large number of instances several distinct stocks appeared under the same name, and, conversely, several names were given to the same stock. The following table illustrates the confusion in nomenclature which occurs.

<i>Stock.</i>	<i>Varieties Included.</i>	<i>Synonyms.</i>
Multiflora (seedling and cutting)	Forms varying as regards vigour, colour and shape of leaf, colour of wood, prickles. One <i>R. Wichuraiana</i> also included	Polyantha grandiflora
Manetti (cutting)	Uniform sample	
De la Grifferaie (cutting)	„ „	Multiflora (Dutch material)
Odorata (cutting)	„ „	
Rugosa (cutting)	„ „	
Smit's Brier (cutting)	„ „	Schmidt's Brier
Unnamed <i>R. canina</i> (seedlings)	Forms varying as regards vigour, leaves, colour of wood, prickles	
Brog's canina	Uniform sample	
Deegen's canina	„ „	
Jägerbataillon	„ „	
Kokulensky	Kokulensky and Laxa in considerable numbers	
Senff	Senff and several other forms of Canina	
Schmidt's Ideal	Fairly uniform sample	
„ Special	„ „ „	
Laxa (seedlings)	English material—uniform sample Dutch material—mixture of Kokulensky and Senff in about equal numbers	
Rubrifolia (cutting)	Uniform sample	
Rubiginosa (seedling)	Rubiginosa, and several forms of Canina ; roughly about one Canina to ten Rubiginosa	

In all instances stocks arising from cuttings were uniform, while stocks raised from seed varied considerably.

The named Canina stocks are of especial interest. It would appear proper that special names should be given to Canina stocks of uniform character only, but in many cases little uniformity was found in these named forms. All the Canina stocks obtained from Holland were seedlings reported as being specially selected from large batches. When they arrived in January they appeared to be quite uniform in colour of bark, buds and other characters, and had evidently been selected when in the winter condition. Subsequent development during the spring showed considerable variation arising in stocks of the same name.

KEY FOR THE IDENTIFICATION OF THE ROSE STOCKS.

The following key is simply for the identification of Rose stocks, making no attempt to classify them, although, to some extent, the stocks fall into their natural groups. Only vegetative characters have been taken into account, and as these vary somewhat under different growing conditions, the headings are necessarily rather long and often descriptive of several characters.

A Shoots arching, the tips often rooting ; either leaves appearing very early, or bush evergreen in mild winter.

B Leaflets small, dull ; stipules laciniated ; prickles absent or few in stipular pairs *R. multiflora* Thunb.

BB Leaflets medium or rather large, leathery, shiny.

C Leaves glabrous ; upper surface dark metallic green *R. odorata* Sweet

CC Leaves hairy on under surface, grass green *R. moschata floribunda* Hort.

AA Shoots erect, spreading, or slightly arching.

B Leaflets large, very smooth ; lower surface glabrous ; prickles small, rather slender, and not of uniform size.

C One-year-old shoots brownish green *R. Manetti* Hort.

CC One-year-old shoots light green Lippiat *Manetti* stock

BB Lower surface of leaflets generally hairy, or, if glabrous, prickles rather large, hooked and of fairly uniform size.

C Stipules very wide, laciniated.

D Prickles very numerous, petioles only slightly glandular Smit's Brier

DD Prickles rather few ; petioles very glandular De la Grifferraie stock

CC Stipules rather narrow, margins entire or only very slightly cut.

D Stipular pairs of prickles present.

E Shoots slender, red ; very few needle-shaped prickles in stipular pairs only *R. setigera* Hort.

EE Shoots strong, with numerous prickles and aciculi scattered in the internodes in addition to the stipular pairs *R. rugosa* Thunb.

DD Prickles scattered, of fairly uniform size, generally hooked.

E Leaves scented *R. rubiginosa* Linn.

EE Leaves unscented.

F Shoots dark reddish purple with bloom ; leaves purplish, glaucous *R. rubrifolia* Vill.

FF Shoots green at least on one side.

G Prickles few, rather slender, only slightly hooked ; leaves very greyish green ; pith of one- or two-year-old shoot appearing green when shoot cut across. *R. laxa* Froeb.

GG Prickles rather robust, distinctly hooked ; pith of shoot white *R. canina* Linn.

Canina stocks.

a Leaflets hairy on upper and lower surfaces Schmidt's Special

aa Leaflets quite glabrous.

b Upper surface of leaf dark purplish green, especially in early spring, leaflets long and pointed Kokulensky's canina

bb Upper surface of leaf bluish green.

c Shoots rather spreading ; two halves of stipules often uneven Jägerbataillon

cc Shoots upright or slightly arching ; the first pair of leaflets arising immediately above the stipules Schmidt's Ideal

bbb Upper surface of leaf dark or grass green.

c Shoots very purplish Deegen's canina

cc Shoots green.

d Leaflets narrow and pointed ; margins not glandular Senff's canina

dd Leaflets rather wide, margin slightly glandular Brog's canina

CYTOLOGY OF THE ROSE STOCKS.

An examination of the cytology of many of the stocks was undertaken, the work being chiefly devoted to an investigation of the

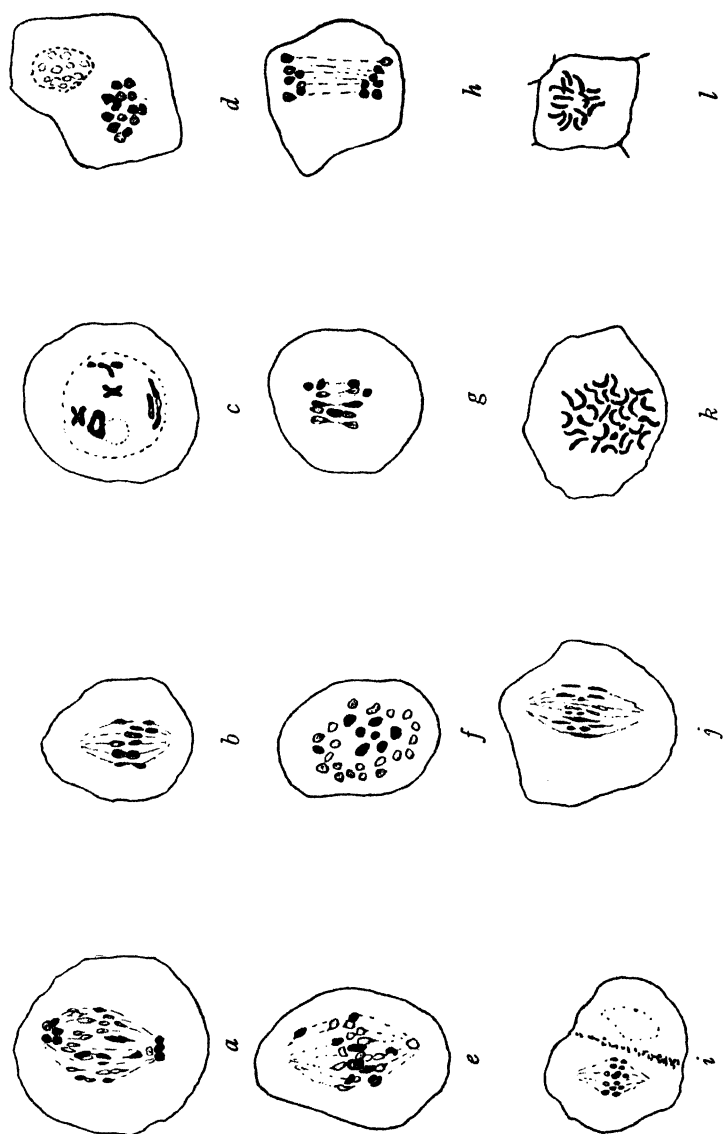


FIG. 120.—CHROMOSOMES OF POLLEN MOTHER CELLS (a—j) AND SOMATIC CELLS (k, l) OF ROSE STOCKS. a, Kokulensky. b, Rugosa. c, Moschata floribunda. d, Manetti. e, Senff. f, Canina. g, Multiflora. h, Smit's. i, Setigera. j, Lippiat Manetti. k, De la Griffierie. l, Odorata.

meiotic phase in pollen mother cells ; in a few instances mitosis in the somatic cells of young petals was also studied.

Method.—A young flower bud was removed ; from it a single anther was taken and mounted in Belling's aceto-carmine, by means of which it was possible to ascertain whether meiosis was taking place in the pollen mother cells. When an anther was found in which

division of the pollen mother cells was proceeding, the bud from which it came was divested of its calyx and corolla, and cut vertically into several parts, which were placed in various fixatives—namely, Licent's, Nawaschin's and Carnoy's. Carnoy's gave rather poor results owing to the slight shrivelling of the cells, and was abandoned. Microtome sections were cut 10 μ thick; these were stained in Haidenhain's iron-hæmatoxylin, 2 per cent. iron alum being used for destaining; picric acid proved to be too slow a destaining agent, and the results obtained were inferior to those given by iron alum. Newton's gentian-violet method was applied successfully, but was less reliable than the hæmatoxylin.

The Genus *Rosa* forms a polyploid series with basic number of 7 chromosomes.

In *R. multiflora*, *R. rugosa*, *R. moschata floribunda*, *R. odorata*, and Smit's Brier the haploid number was 7, the diploid 14. In *R. multiflora* (fig. 120g) both the heterotypic and homotypic divisions were found to be quite regular, and the division of the pollen mother cell gave rise to uniform tetrads. A high percentage of flowers produced fruits and nearly all the achenes germinated during the first year. These results support the conclusion that *R. multiflora* is a true species.

R. rugosa (fig. 120b) also gives regular segregation. FELIX and DYKHUIS, Boskoop, Holland, have reported that their *Rugosa* stock is a cross between *R. rugosa* and "another wild species." The *Rugosa* stocks, which I investigated, were of English origin grown on Plot B, and were identical in vegetative characters with the stocks from Holland, which have not yet flowered.

In a study of the pollen mother cell during meiosis there is no evidence of hybridity, the heterotypic and homotypic divisions being perfectly regular, exactly as in the true species. Fruits were readily produced by self-pollination, and the resulting seeds germinated readily, giving a uniform batch of seedlings like the parent plant in the first generation, although FELIX and DYKHUIS state that their *Rugosa* stock must be propagated vegetatively to keep its good qualities. The regularity observed in the distribution of the chromosomes in the meiotic phase of the *Rugosa* stocks does not support the view that they are of hybrid origin, as stated by FELIX and DYKHUIS.

In *R. moschata floribunda* (fig. 120c) segregation during meiosis is quite regular; fruit is also readily formed, and the seed, resulting from self-pollination, gives a fairly uniform batch of seedlings. These results support the conclusion that *R. moschata floribunda* is a true species. Many of the seedlings, however, differed from the parent plant in having laciniated stipules, the occurrence of which seems to suggest either that *R. multiflora* has entered into the constitution of *R. moschata floribunda*, or that the laciniated stipules are merely a juvenile character of no genetical interest.

In *R. odorata* (fig. 120l) only the somatic chromosome count has been obtained, revealing a diploid number of 14. Hips developed

freely, but even in those which were self-pollinated rarely more than one achene was formed. As yet no seedlings have appeared.

Smit's Brier (fig. 120h) is reported by the raiser as being a cross between *R. rugosa* and *R. canina*, and its external characters suggest that this is correct. It has the same type of prickles as *R. rugosa*, and slightly rugose leaves, combined with the delicacy and colour of flower of *R. canina*. Although seven bushes flowered freely in 1931, not one hip was produced, even by artificial pollination with its own pollen, or with that of *R. rugosa* or *R. canina*. The haploid chromosome number of 7 and the regular segregation are difficult to explain.

ERLANSON * quoting Täckholm has stated that in *R. canina* the male gamete carries only 7 chromosomes, while the female carries the perfect complement of 28 (7 + 21). It seems reasonable to suggest that in Smit's Brier *R. rugosa* was the female parent and *R. canina* the male parent, which would account for its small chromosome number. In Smit's Brier segregation during meiosis is quite regular, but its complete sterility suggests that the parents of this stock were dissimilar in chromosome content.

Manetti (fig. 120d).—In the pollen mother cell 14 clearly defined bivalents are present, and segregation is quite regular. REHDER in his Manual states that *Manetti* is one of the Noisettiana Roses which were produced by crossing *R. chinensis* with *R. moschata*. As some varieties of *R. chinensis* have haploid number 7 and others 14, and *R. moschata* haploid number 7, it seems unlikely that REHDER's statement is correct. In Index Kewensis, *Manetti* appears as a variety of *R. chinensis*, which is in accordance with its chromosome content.

Lippiat Manetti (fig. 120j) is very similar to *Manetti* in cytological behaviour. In the pollen mother cell are 14 bivalents which divide in a regular manner. Many hips were produced on the bushes, but very few seeds were set, and so far few of these have germinated.

De la Grifferaie (fig. 120k) flowered very sparsely, and the chromosome count was obtained only in the somatic cells. Like *Manetti* it is tetraploid, having 28 chromosomes. The specimen bush on Plot B set no fruit, but the bush at Kew fruited moderately freely.

The remaining stocks investigated are all more complicated polyploids.

The *Caninae* are a very interesting group of polyploids which have been more extensively investigated than any other group of Roses. The usual number of chromosomes in the pollen mother cell is 28, but some species or forms of the group have 21 or 35 chromosomes.

Of the *Caninae* I examined Kokulensky (fig. 120a), Senff (fig. 120e), and a mixed batch of *Canina* stocks. In each 28 chromosomes are seen at metaphase in the pollen mother cell, and clearly consist of 7 bivalents and 21 univalents. On the equatorial plate in the heterotypic division the 7 bivalents can be seen lying in the centre of the group (fig. 120f) and are slightly larger than the univalents which

* ERLANSON. *Chromosome Organization in Rosa*, Cytologia 2 (1931), p. 256.

surround them. In anaphase the 7 bivalents behave normally, the two components of each bivalent passing to opposite poles. The univalents may also divide and segregate, or alternatively pass undivided to the poles (fig. 120a). In either case the homotypic division may take place while some of the univalents or half-univalents are still lagging on the spindle. Again, tetrads are formed very irregularly, and a large percentage of the pollen is sterile. ERLANSON has stated that the Caninae are unique among polyploids in having no more than 7 bivalents at diakinesis, for although the somatic numbers may be $4n$, $5n$ or $6n$ the rest remain unpaired. This condition is maintained by facultative apomixis and also by special mechanism whereby the functional megaspore receives all the unpaired chromosomes together with 7 that have paired, while the functional pollen grain receives only 7 chromosomes from the original bivalents of the pollen mother cell.

Rosa setigera (fig. 120i) is unusual in the behaviour of its univalents. In the heterotypic division 7 bivalents first divide and pass towards the poles in a normal manner. At the equator of the spindle, however, a dense mass of chromatin remains, presumably composed of univalents which it is impossible to count with accuracy. The latter do not appear to divide, the chromatin mass becoming rather less dense and then disappearing. Meantime the 7 chromosomes at the poles divide again, in the homotypic division, apparently without having coalesced to form a temporary nucleus. Rather irregular tetrads are formed, so that in all probability a large percentage of the pollen is sterile. The female gamete has not been studied, but as the stock sets fruit readily and yields a uniform batch of seedlings, either apomixis occurs or, as in regard to *R. canina*, the female gamete contains the perfect chromosome complement, while the male gamete supplies only the 7 chromosomes arising from the bivalents of the mother cell.

PROPAGATION.

Rose stocks are propagated by cuttings and seedlings, the former being more usual in English nurseries.

Cuttings.

The 1930 trials showed that, in the majority of stocks, cuttings taken just below the node rooted more freely than those taken through, or just above, the node. All cuttings of Multiflora stocks rooted freely.

In 1931 all cuttings were taken just below a node, and most stocks rooted readily. *R. rugosa*, *R. rubiginosa*, *R. setigera* and *R. rubrifolia* were slow to root, the first three giving rather a low percentage of rooted plants; on the other hand, *R. multiflora*, Smit's Brier and *R. moschata* rooted comparatively rapidly, giving a high percentage.

Two stages may be recognized in the rooting of a Rose cutting—namely, (1) the blocking of the cut tissues followed by callus formation, and (2) the formation of root primordia and development of the roots.

The pith and the older cortex cells are protected by a narrow layer of cork cells formed just above the wounded tissue ; the wood cells exude a brown gummy substance which effectively closes the cut ends of the cells.

When cuttings are inserted in damp soil or placed in a damp atmosphere the formation of callus tissue commences in a few days, particularly when the cuttings are taken in spring ; only a very small amount of callus is formed in those taken in autumn, but in the following spring further production of callus takes place. Good aeration

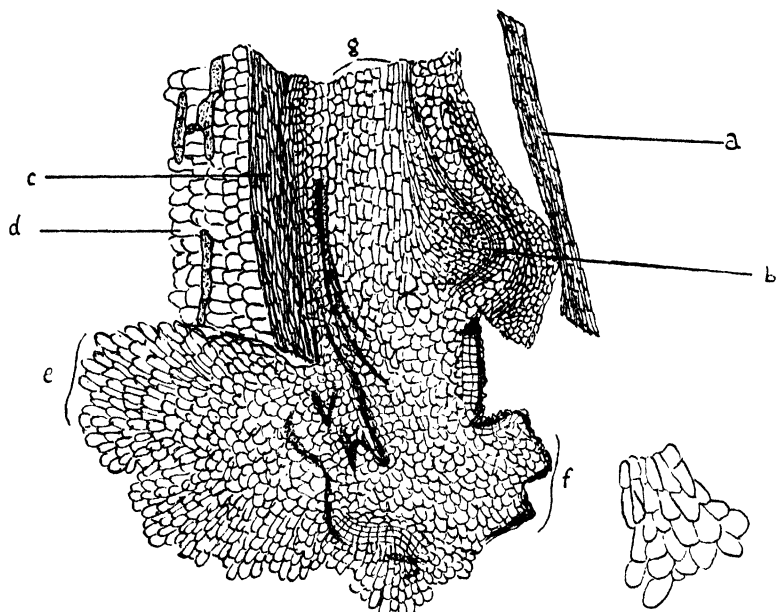


FIG. 121.—CALLUS FORMATION AT BASE OF CUTTING. RIGHT SHOWING EXTENSION OF TISSUE.

a, Epidermis, etc., being pushed out by new tissue. *b*, Young root. *c*, Wood, and *d*, pith of cutting. *e-f*, Callus. *g*, New tissue formed by cambium of shoot.

promotes callus formation. This process is much more rapid and extensive in cuttings of some of the stocks than in others ; *R. multiflora*, *R. moschata* and *R. odorata* all produce a large amount of callus tissue, while in *R. rubiginosa*, *R. rubrifolia* and *R. laxa* only a very small amount is formed. A considerably larger callus arises at the proximal end than at the distal end of the cuttings, and in the less vigorous cuttings no distal callus is formed.

The callus tissue consists of thin-walled cells which are formed from the cambium and new phloem parenchyma cells (fig. 121). These thin-walled callus cells absorb water, and a transverse wall is rapidly formed a short distance from the free end of each cell ; the cell so formed continues to grow and the process is repeated until a delicate white tissue is formed over a part or the whole cut end of the shoot (fig. 121, right).

The root primordia arise as small groups of cells in the callus tissue close to the cambium of the shoot. In most of the cuttings root formation is not confined to the base of the cutting but occurs at

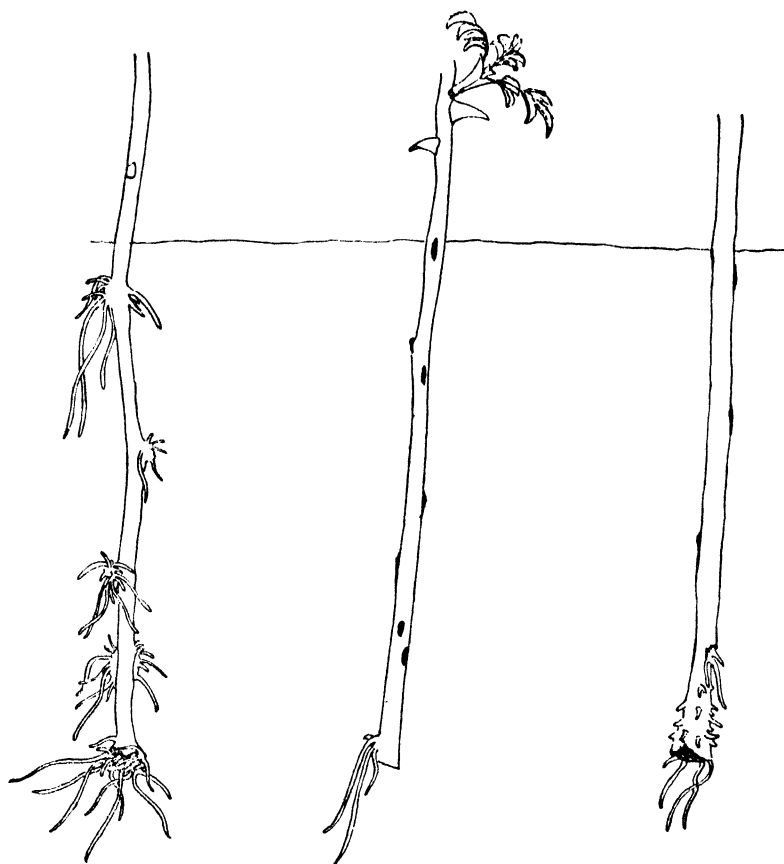


FIG. 122.—ROOTED CUTTINGS.

Multiflora rooting at several nodes.

Canina rooting at base only. Roots arise higher later.

Smit's Brier. Internodal rooting.

all the lower nodes of the stem. This is particularly noticeable in *R. multiflora* and *R. moschata* cuttings (fig. 122).

CARLSON* working with 'Dorothy Perkins' and 'American Pillar' Roses found that cuttings of the former rooted very much more easily than those of the latter. She showed that much more starch was present in the shoots of 'Dorothy Perkins' than in those of 'American Pillar,' some starch still remaining when the former rooted, while the starch supply of the latter was exhausted before rooting commenced. CARLSON suggests that the root formation may be influenced to some extent by the amount of starch present in the cutting. I found, however, that Smit's Brier cuttings, which were amongst the

* CARLSON, M. *Rose Cuttings*, Bot. Gaz. 87 (1929), pp. 64-80.

first to root, contained less starch than some *Canina* cuttings which did not root until several weeks later.

SMITH* states that a certain carbon : nitrogen ratio is necessary before cells become and remain meristematic. In mature cells the carbon, which is in the form of carbohydrate, is in excess of the nitrogen, which occurs in the form of protein. Before a mature tissue can become meristematic this ratio must decrease. CARLSON found that a high percentage of protein and a low percentage of reducing sugars were present in the phloem parenchyma which formed at the base of the new shoots of 'Dorothy Perkins,' and from which the root primordia arose.

This subject has not been sufficiently investigated, and further work is necessary before satisfactory conclusions can be attained.

Seedlings.

The achenes, and the young seedlings of all the *Roses* mentioned, are fairly similar in structure.

R. rugosa germinated freely and was therefore chosen to illustrate the type (fig. 123).

The achene consists of a hard pericarp composed mainly of empty thick-walled cells extensively pitted, with narrower cells almost without cavities towards the inside, and smaller cells towards the outside. Enclosed in this is the non-endospermous seed, the testa of which is brown and almost transparent. The two cotyledons are unfolded. Reserve material is in the form of oil, starch being absent. The radicle is small and the plumule scarcely visible.

In germination the pericarp is carried up above the soil level on the elongating hypocotyl. In about two days the pericarp splits in two and, with the testa, is shed. The hypocotyl straightens, and the cotyledons open out and develop stalks about $\frac{1}{4}$ inch long. Round the margins of the cotyledons and on the upper part of the hypocotyl are greyish glands, each of which consists of a short stalk composed of several cells, expanded at its apex into a spherical head of about eight cells. The cotyledons are not arranged quite symmetrically at the node, being slightly closer together on the side opposite the first leaf. In the hypocotyl complete root structure is present a very short distance below the node. The first two leaves are usually ternate. The root system consists of a narrow tap-root with finer rootlets covered throughout the greater part of their length with root hairs, which are occasionally branched. The root is usually diarch, but may be triarch, tetrarch or polyarch.

In many cases the roots bear nodules of various sizes, the largest about as big as a *Rose* achene; an examination revealed no insects or bacteria present. The structure of the nodules is similar to that of the root except that the cortex is very much enlarged. In one case

* SMITH, E. P. *Anatomy and Propagation of Clematis*, Bot. Soc. Edin. 29 (1924), p. 17.

a mycelium was present in the outer cortical tissues, but this appeared to be of saprophytic nature, being present in great quantity in the outer tissues of the roots, but never entering the stele.

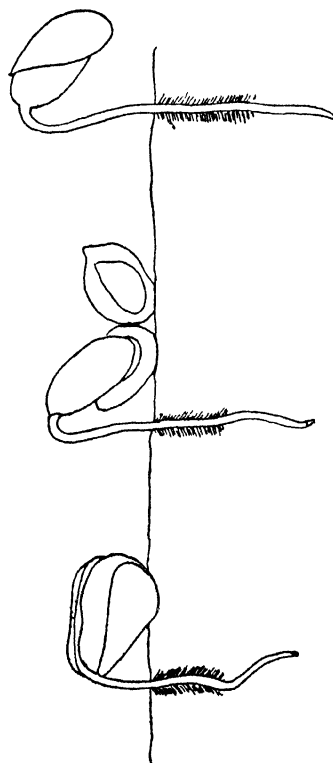
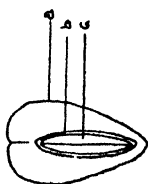
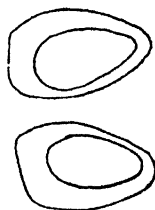
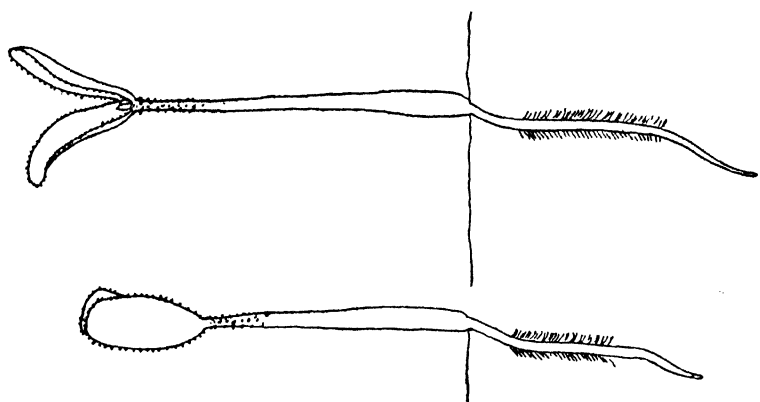


FIG. 123.—GERMINATION OF *ROSA RUGOSA*.

Joining of the Bud and Stock.

Cultivated varieties of Roses are almost always propagated by budding on stocks.

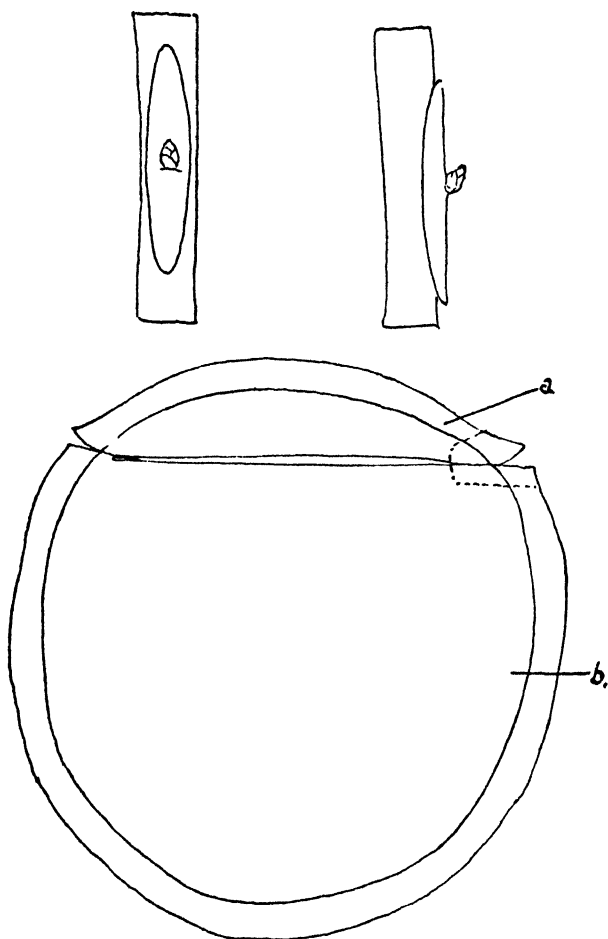


FIG. 124.—ROSE-BUDDING.

Below. Stock (b) and bud (a) cut transversely.

Above. Bud slightly swollen five weeks after insertion.

Early in April buds were inserted on stocks which had been brought into the greenhouse in February, and were breaking into growth. Shield budding was the method adopted.

Examinations were made at intervals to show how the junction of the stock and bud proceeded.

After five weeks the buds were swelling, and transverse and longitudinal sections were cut through the bud shield and the stock.

From fig. 124 it can be seen that only a very narrow band of tissue has formed a link between the stock and the bud. The cambium of the

stock and, to a lesser extent, that of the bud have become very active, and formed a continuous band of meristematic tissue from which

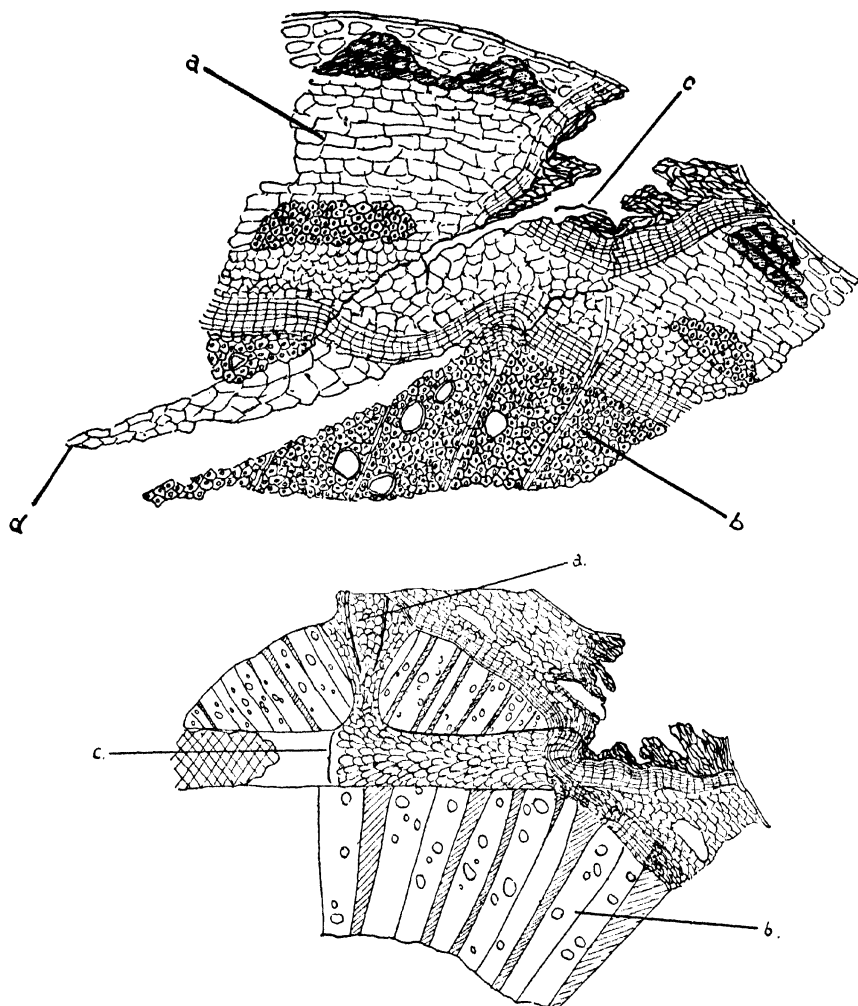


FIG. 125.—ROSE-BUDDING.

Above. Five weeks after insertion of bud.

Below. The same when bud has grown out.

a, bud. *b*, stock. *c-d*, callus tissue joining bud and stock.

callus cells are extending into the narrow gap between the xylem of the bud and that of the stock. Throughout most of its width the bud is still unattached to the stock.

A longitudinal section shows that at each end of the bud shield rather more callus tissue has been formed (fig. 124).

Another examination was conducted when the bud had grown out about three-eighths of an inch, at which stage callus tissue had almost filled the space between bud and scion (fig. 125). Neither the

wood nor the bast of the bud is anywhere united to the corresponding elements of the stock, but at the lower end of the bud shield the union is almost complete, the newly developed cambium layer having formed a considerable amount of wood parenchyma. Evidently the bud is still obtaining nourishment through the callus tissues.

Buds inserted on stocks in July 1931 were also examined in May 1932, and were found to have completely united with the stocks and were behaving exactly as natural buds.

NURSERYMEN'S OPINIONS.

Very little direct information is available regarding the effects of the stock upon the scion in Rose growing. Many different views are expressed by nurserymen when this question is discussed, but trials extending over many years will have to be undertaken before any really reliable conclusions can be reached.

Rose growers not infrequently hold definite opinions regarding some of the stocks, but since little agreement can be discovered among them, it is clear that the problems involved require further investigation.

The following account may be taken as a summary of the views expressed by Rose growers regarding the influence of the stocks mentioned.

R. moschata floribunda.—This is a very vigorous stock with an extensive, rather spreading root system consisting of thick roots with a considerable amount of fibre. Cuttings root readily and are the only form used. Budding is easy and the percentage of successes is high with strong-growing varieties of Roses, but the stock is considered too vigorous for the more delicate sorts. Up to the present it has been little used, but is well worth a trial as a stock for use on rather poor soils and for Roses grown in pots.

R. multiflora.—This stock is a vigorous grower with coarse stems, and a root system similar to *moschata floribunda*. It is one of the first stocks to break into growth in spring. Both cutting and seedling stocks are used, cuttings rooting very readily, and a large proportion of the seed germinating the first year after sowing. The short neck of the seedling and the thin bark of both cutting and seedling make budding difficult. Suckers frequently arise, especially if the cutting is used, this difficulty being practically eliminated with the seedling if the bud is inserted on the root a short distance below the crown. The cutting is successfully used for vigorous Teas and Hybrid Teas, most climbing Roses and dwarf Polyanthas, giving excellent bushes the first year. A large number of flowers are produced, but as a rule the blooms are of poor shape and colour.

The seedling stock is reputed to give a rather short-lived plant with Teas and Hybrid Teas, but is satisfactory for Polyantha Roses; it has been employed successfully as a stock for Roses grown in pots and is fairly popular in large nurseries where quality is not the main consideration.

R. Manetti.—This is a vigorous variety, having a deep, coarse root system with few fibres. Cuttings strike readily and are the only means of propagation, as fruit is rarely produced. Budding upon this stock is easy and can be performed as late as September; the "bud take" is moderate and the union is good, but the buds not infrequently commence growth in the autumn and are liable to be killed by frost.

Manetti is used for Hybrid Perpetuals, a few strong Hybrid Teas, and some Polyantha and Wichuraiana Roses; Teas, Pernetianas and most Hybrid Teas grown on it prove to be very short-lived. Several Rose growers have found that it transplants badly, but it is a good stock for Roses grown on sandy soils and for pot work where its vigour is kept in check. It has been specially recommended for use with greenhouse Roses, owing to its giving a continuous supply of blooms through a great part of the year without requiring a resting period. Maiden plants on Manetti are good, especially Hybrid Perpetuals, and it is largely used for the growing of exhibition Roses. In America it is a very popular stock, but in Britain its use is gradually being restricted.

Lippiat Manetti.—Very little is known of this stock. It is very like Manetti and has the same deep, coarse root system. Cuttings strike readily, but the seedling stock is not used.

De la Grifferaie.—This stock is of vigorous growth with a root system similar to that of Manetti, and is propagated solely from cuttings, which root readily. It is quite easy to bud, giving a good percentage of successes, and it proves quite satisfactory for strong-growing climbers, dwarf Polyanthas, Chinas, and some Teas and Noisettes, but tends to smother more delicate varieties. For several years it was a popular stock for the 'Gloire de Dijon' section and 'W. A. Richardson.' It is recommended for pot work, some Roses succeeding on it which fail on Manetti, but it is not a popular stock.

R. odorata.—This variety is a vigorous but not very hardy stock. It has a medium-sized, rather fibrous root system. Cuttings root readily, and Roses grown on it transplant well. In this country it is seldom used, but in America it is popular as a stock for forcing Roses, and is found to be in general equal to Manetti in the number of blooms produced, and, for yellow Roses, superior. Out of doors it is good for bush Roses, but produces a considerable number of suckers.

R. rugosa.—This is a rather vigorous variety with a shallow and very fibrous root system. It is readily propagated by cuttings and from seed. The seedling stock should be avoided, as it is awkward to bud, and gives sickly growth with a large number of suckers. The cutting grows vigorously, and can be budded the first year after transplanting, the "bud take" being good. Rugosa is used mainly for Polyanthas and some Hybrid Teas, but is useless for difficult Roses. For bush Roses out of doors it is seldom employed, as suckers are frequently produced, but it is popular as a stock for standards, as it gives a strong straight stem, and a tree which blooms freely. It is often used as a stock for Roses in pots, and is specially recommended

for early forcing as the sap "moves more easily than in any other stock, buds starting into growth almost at once." On rich soils it is reputed to give over-vigorous pithy growth, and foliage liable to black spot, but it proves useful on light sandy soils.

Smit's Brier.—This is a vigorous stock, having a stout stem and an extensive root system with a considerable amount of fibre. As it sets no fruit it is propagated only from cuttings which root very readily.

Its straight strong stem makes it a good stock for standards and it promises to rival *Rugosa*. It is reported to be suitable for any type of soil, but is not yet extensively used.

R. setigera.—This stock has a very fibrous root system resembling that of *Rugosa*, but is not a very vigorous grower. The "bud take" is moderate, suckers are of common occurrence, and Roses grown on it seem to be uniformly poor; it is therefore not recommended.

R. canina.—Owing to the great variety in the commonly used unselected *Canina* stocks it is almost impossible to generalize in regard to their qualities. All forms of *R. canina* are evidently not suitable as stocks, but as complete descriptions of the useless forms are not available as yet, it is impossible to eliminate them; furthermore, it is probable that a stock which has proved worthless in one district may be quite successful in another. All *Canina* stocks grow best on medium or heavy loams; on light sandy soil their growth is poor. Rose growers are well advised to use one of the named *Canina* stocks because of the nearer approach to uniformity of such selected material; of these *Kokulensky's* and *Senff's Caninas* are probably the best known.

Kokulensky.—This stock is of moderate vigour, and its rather deep root system, consisting of strong roots with little fibre, is typical of *Canina* stocks. Cuttings root readily, but it is usually propagated from seed, and is reported to give a fairly uniform batch of seedlings, the majority being like the parent plant. It is easy to bud, gives a high percentage of "takes," and a good union. Hybrid Teas and Hybrid Perpetuals and *Pernetianas* do well on it, even the more delicate varieties growing fairly successfully and lasting well. Some suckers are produced, but not in sufficient numbers to be troublesome. The stock proves good on all medium or rather heavy soils and is in common use throughout the country.

Senff.—*Senff* is equal in vigour to *Kokulensky* and has a similar type of root system. The seedling stock is commonly used, and should be budded when $2\frac{1}{2}$ years old, as the bark soon becomes thick and dry. The "bud take" is good, but several nurserymen have found that later in the season the buds are liable to "blow out." *Senff* is a good stock for Hybrid Teas, Hybrid Perpetuals and *Pernetiana* Roses, and is said to produce especially well-coloured blooms. It can be used for both bush and standard Roses; stocks to be used as standards should be raised in soil which allows early growth, as the wood is reputed to take rather a long time to ripen, and unripened wood is liable to die back in winter.

Senff is as widely used as *Kokulensky*, and although perhaps not as uniformly satisfactory is a very good stock in most districts.

The remaining named Canina stocks have been used for such a short time that their qualities are little known. Brog's and Deegen's Caninas are more frequently met with than Jägerbataillon, Schmidt's Ideal or Schmidt's Special. Brog's and Deegen's stocks are slightly more vigorous and have a more fibrous root system than is general in Canina.

Whether cutting or seedling Canina stocks should be used is a question which has been much discussed. Seedlings vary considerably in vigour; some of them are very liable to disease, and there is no uniformity in Roses grown on these stocks. In dry districts Roses grown on the seedling stocks prove better than those on the cuttings, as the former are deep rooting, but in general they produce rather small bushes and inferior blooms. Batches of stocks raised from cuttings are much more uniform than the seedlings, have a more fibrous root system, and are usually free from disease. Except on light sandy soils cutting Canina stocks are generally considered to be the most satisfactory stocks used at the present time. The named Canina stocks should be propagated by cuttings, as only by vegetative methods of reproduction can uniform material be obtained. Almost the only argument in support of seedlings, as opposed to cuttings, is that they are less troublesome to raise, and it is probably because of this that so many seedling stocks are put on the market.

The general consensus of opinion is that all nurserymen should raise their own Canina stocks by means of cuttings from a form of Brier which proves a satisfactory stock in their district.

Laxa.—This stock is of moderate vigour and has a rather small root system of the Canina type. It does not grow very readily from cuttings, but is not difficult to raise from seed, and being more cheaply obtained seedling stocks are more commonly used than the cuttings. *Laxa* is easy to bud, and budding may be done out of doors as early as May, but many nurserymen find that a good percentage of "takes" cannot be guaranteed, for one batch of buds may give almost 100 per cent. good results, while other buds put in a week later may nearly all fail to unite with the stock.

The seedling stock is said to give good results with Pernetianas, the blooms being especially fine in colour and shape.

The *Laxa* stock ripens the wood early, which results in few losses in winter, but on the other hand makes it worthless for Roses designed to give an autumn display.

A great drawback to the stock is that Roses grown on it are generally considered to be subject to rust attack. This has been experienced in all parts of the country, and owing to the increasing menace of Rose rust the use of this stock is not usually advised.

R. rubrifolia.—This stock is of moderate vigour, and has the Canina type of root system. Cuttings root rather slowly and seed does not germinate freely. Seedling stocks are liable to rust attack in early spring, and Roses grown on both seedling and cutting stocks seem to be rather subject to mildew. In many cases Roses on *Rubrifolia* grow rather weakly, and suckers are freely produced from the stock.

R. rubiginosa.—This common, hardy British Rose is of moderate vigour, having a rather small root system of the Canina type. It is fairly readily propagated from cuttings, but owing to its extremely prickly nature is unpleasant to handle. The bud take is good, and Hybrid Teas and Hybrid Perpetuals and Pernetianas grow well on it, giving good maiden bushes. The stock itself is very long-lived, bushes being known well over a hundred years old, and Roses grown upon it have a satisfactory length of life. Suckers are seldom produced, and the stock proves good on most soils and in most parts of the country.

I.X.L..—This American stock has not yet been used in England and has not been under my observation. It is a seedling of Vielchenblau (the Blue Rambler) and was raised by D. W. COOLIDGE in the Coolidge Rare Plant Garden, Pasadena, California. COOLIDGE states that it is very vigorous and has smooth bark and few prickles. When budded it gives a "bud break" in five days, and flowers in twenty-eight days, so that it is an extremely useful stock for testing new varieties of Roses.

R. Fortuneana.—This stock is not used in England and has not been under my observation. It is commonly used on the Riviera, and is said to transmit its remarkable vigour to the scion.

CONCLUSION.

From the evidence available up to the present time the conclusion is reached that the perfect stock for British Rose growers should exhibit the following characters :

(1) Moderate vigour with a semi-spreading root system consisting of some rather thick roots with a considerable number of fibres.

(2) Easy propagation, and freedom from prickles so that cuttings are easily handled.

(3) A long clean "neck" (or space between the lowest buds of the stem and the first roots), making budding easy.

(4) A good bud take.

(5) Suitability for all varieties of Roses.

(6) Adaptability to all soils and climatic differences in Britain.

(7) Freedom from suckers after budding.

(8) Longevity and moderate vigour of the scions.

(9) Floriferousness, good form, colour, and size of flower, and extension of the flowering period from June until about the end of September.

(10) Freedom from diseases and pests.

(11) Thorough ripening of the wood in autumn so that frost damage is not severe.

It is unlikely that any one stock will combine all these qualities, and extensive trials are necessary to determine which of the above characters are possessed by the different stocks in use at the present time, in order that Rose growers may select stocks suitable for particular purposes.

For a thorough investigation of the problem involved in the use of the various Rose stocks at present employed, a series of trials on the lines indicated below would be of the greatest service to the Rose grower, and it is hoped that such trials may be undertaken in the near future.

(1) Collect stocks from all possible sources, and plant out in suitably prepared ground in autumn or early spring.

(2) When the stocks come into leaf, remove all those which do not correspond to type, so that only uniform batches remain to be budded.

(3) Select six different Hybrid Teas of varying vigour, four Pernetianas, three Climbers, three Hybrid Perpetuals and three Teas, and grow at least fifty Roses of each variety on each stock. Hybrid Tea and Pernetiana Roses are perhaps the chief types because they are very widely grown, but some of the most beautiful are of slight vigour, and consequently difficult to grow.

(4) Bud in June or early July, and the following spring record the "bud take."

(5) Leave half the Roses, of each variety on each stock, unpruned, as in this way a better indication of their vigour is obtained; prune the other half, every year in the usual way, and give, to all the Roses, normal cultural conditions.

(6) Every year record, on all Roses, the wood growth, number of flowers and length of flowering period, occurrence of diseases and pests, and severity of frost attack; note also the occurrence of suckers, and any differences which may occur in the foliage and flowers of each variety on different stocks.

The trials may be considerably expanded to include effects of soil and manurial treatment, but the first essential is to determine the characters of the stocks under normal conditions.

Up to the present time little attempt has been made to cross different Rose stocks in order to combine, in the offspring, some of the desirable qualities of both parents. Smit's Brier is the only hybrid which has been raised in this way and the result promises well, although this stock may be of too great vigour. Until the suggested trials have been carried on over a period of several years in order to determine the characters of the stocks at present in use, crossing with a definite object in view must be delayed.

At present, the most useful step that can be taken is the discontinuance of the use of seedling stocks. The only claim which can be made for seedling stocks is that on very dry soils their deeper root system is an asset, but in the British climate such a consideration is seldom necessary. The use of clonal material ensures uniformity which is of the utmost importance.

The great improvement in the cultivation of the Apple which has resulted from the use of 'Paradise' stocks, selected after extensive and carefully conducted trials, suggests that equally good results would be obtained in Rose growing if similar methods were employed in the selection of stocks.

AUTUMN COLOURING AND BERRIES AT THE ARBORETUM,
WESTONBIRT.

By W. J. MITCHELL.

[Read Oct. 11, 1933 ; The Marquess of HEADFORT in the Chair.]

MY late employer, Sir GEORGE HOLFORD, was one of the largest planters of autumn-colouring trees and shrubs in this country. As a result the Arboretum at Westonbirt and the Silkwood which adjoins are a blaze of colour from the end of September until frost or heavy rain comes and destroys this autumn pageant. Probably nowhere in the British Isles can such a brilliant display be seen as at Westonbirt.

Sir George's father planted enormous numbers of yews and other conifers. Sir George himself made splendid use of these dark and sombre backgrounds by planting in front of them, and thus enhancing the beauty of the various colouring plants. This background also serves the purpose of protection from late spring frosts and cold east winds, to which we are particularly susceptible in this locality.

An elevation of nearly 500 feet on the Cotswolds is not an ideal situation for trees and shrubs, and at times, especially in the early spring, east and north-east winds are very trying to vegetation. Frost, although sometimes severe, does not in my opinion do us so much harm as these terribly cold winds which frequently prevail for weeks at a time. The late Mr. HOLFORD was probably of the same opinion, and that is perhaps the reason why he planted such large quantities of particularly hardy evergreens for protection.

This background frequently wards off the evil effects of 2 or 3 degrees of frost in late spring or cutting cold winds, which would very soon destroy the young foliage of many shrubs and trees, especially those from Eastern countries, which in England will start into growth too early—for example, all the forms of Japanese Maples, *Cercidiphyllum*, etc. Although this does happen with us occasionally and no great harm is done, I am convinced that the cumulative effect of these late frosts occurring for two or three seasons in succession is fatal. Death may not occur immediately; it frequently does not, but it is only a matter of time. When the plant does die, we wonder why, having probably forgotten the ordeal which it has gone through during successive springs.

To those who have gardens in the south or west with a milder climate this does not apply so much, but for those who are gardening in the north and east I would particularly stress the necessity of this shelter for the many plants which will start into growth too early in the year. It is the early growth having a long season for maturity that is likely to give the finest autumn colouring.

Frost is at times severe, thus it is impossible to grow anything of a tender nature for many years. From 20° to 24° of frost is to be expected in an ordinary winter. In the winter of 1928-29 we registered as much as 30° and only just under for several nights, accompanied by a strong north-east wind, which found its way into the most sheltered places, and did a large amount of damage.

Our average rainfall over a period of fifty years is just over 36 inches. In 1921 the fall was as little as 23·16 and in 1912 as large as 50·24. In very few summers are we spared the unthankful task of watering, and sometimes it has to be on a large scale with horse water-barrels, thus entailing considerable labour.

The soil at Westonbirt is typically Cotswold, purely an oolite formation topped in places with not more than 6 inches of soil over the brash. Curiously enough, both in the Arboretum and Silkwood there are large pockets of sandy loam, practically free from lime, in which Rhododendrons and other lime-hating plants grow luxuriantly with the addition of leaf mould. These patches are practically reserved for those trees and shrubs which will not tolerate lime, but where colouring trees have been introduced to them we do not find it makes any difference in their growth.

In many places planting has been done in bays and nooks, where very little sun penetrates at any time in the year; such things as *Acer palmatum* in all its forms do not seem to mind this and grow and colour as well as those in a more open situation. In dark places such as these their exquisite tints are more pronounced and light up to perfection.

On the Cotswolds the indigenous trees and shrubs in a good season are a wonderful sight, even the Common Alder assuming a chocolate hue. Cornus and Euonymus are also most beautiful, but why this is so is beyond me to explain; probably it has to do with soil conditions, and this is the reason why we get such a good display from so many imported trees and shrubs.

Whilst most genera in cultivation provide us with one or more trees or shrubs worth planting for autumn effects, it would be quite impossible for me to attempt anything like a complete list of these in the short time at my disposal this afternoon. Many of you could add many things to those I shall mention, for we do not pretend to grow all at Westonbirt.

Without doubt the genus *Acer* furnishes us with the most gorgeous and brilliant autumn effects. Japan, China, Europe, and America all give us species and varieties well worth growing in this respect.

At Westonbirt the Japanese Maples take pride of place, there is nothing to outclass them; planted extensively, some are as much as 30 feet high and as much through, and when in a good colouring season, and they are at their best, they are a sight long to be remembered.

Some years ago the late Sir George raised a large number of seedlings from his best colouring forms of Japanese Maples, and these

have been planted in permanent positions for many years now. The variety and beauty of these seedlings must be seen to be realized. A very small number were perhaps rather poor, but the varying colours of the remainder, in shades of apricot, gold, salmon and fiery scarlet, amply demonstrate the wisdom of raising them at home, and we are continuing to do so with very satisfactory results. Another remarkable thing about these seedlings is their vigour; it is doubtful if grafted plants (and, of course, we must graft to get types true) ever make such fine specimens as these seedlings are doing.

Besides the seedlings there are numbers of *A. palmatum* var. *dissectum* in its different forms. Of these *purpureum* and *ornatum* are the best. One very large specimen of the latter, 9 feet high, never fails to colour marvellously in a rather shaded position. Of the *Septemlobum*s, 'Osakazuki' is the finest for autumn, and there are two or three fine specimens of this at Westonbirt; green in summer, it turns to a wonderful blood-red, and with the sun shining on it can be seen from a very long distance. It is doubtful if imported trees of it are the true plant. Another fine colouring form is *purpureum*. Large trees of this variety with purple foliage all the summer are particularly fine when their leaves turn to vivid red. *Sanguineum* is also a good form, much lighter in colour in summer than *purpureum*.

After the *Palmatum*s, *A. nikoense* is perhaps the finest colouring *Acer* of all. In some seasons it excels *palmatum* and its forms, in my opinion. The year 1930 was a great one for *A. nikoense* as regards colouring; it will be many years before its marvellous beauty fades from memory. In 1931 it was not so good.

There are several large specimens of *A. rubrum* in the Silkwood of the form called *sanguineum*. These are the best of the large growing Maples to colour; trees 50 feet high are very effective when at their best. Although large specimens of *A. saccharum* do not turn a very good colour in the Arboretum, in the Silkwood, where the soil is shallower and the brash not far underneath, it can be an extremely lovely tree. The colour is flame; it is however very fleeting and its beauty is soon over.

The two forms of *A. japonicum* known as *vitifolium* and *laciniatum* give magnificent displays, especially the former. There are trees of this variety 25 feet high; they are usually the earliest Maples to colour.

Other good colouring species are *A. capillipes*, *A. Henryi*, *A. pictum*, *A. laetum*, *A. diabolicum*, *A. pennsylvanicum*, *A. dasycarpum*, *A. Davidi*, *A. platanoides* and its varieties *Schwedleri* and *palmatum*, and the purple-leaved Sycamore, which is very handsome in some seasons, especially in the early morning or evening light.

In Silkwood several very large trees of *A. dasycarpum* turn a very pale yellow, quite an unusual shade, and a pleasing change from the usual shades of red, orange, and yellow. The Norway Maple can also be very fine, the variety *Schwedleri* especially being very good with us. This does not grow so large as the type and ought to be planted more

than it is in gardens of moderate extent. The cut-leaved form of *A. platanoides* (the var. *palmatum*) is another good subject, taking less room even than *Schwedleri*, but I believe it is scarce in commerce.

At Westonbirt the finest Barberries for autumn tints are *Berberis Giraldui*, *B. Jamesiana*, *B. Thunbergii*, *B. virescens* and *B. Francisci-Ferdinandii*. *B. dictyophylla*, when its silvery foliage turns a delightful pink, is distinct from any other shrub I know, the long pendulous arching branches also add to its beauty, and it is worth a place even in a small collection. *B. morrisonensis* is a dwarf species colouring late, and usually prolongs the season well into December. *B. Thunbergii* is a very desirable species although a somewhat slow grower, and therefore useful for a limited space. About half an acre of this planted on a piece of rising ground is certainly a wonderful sight. *B. Sieboldii* is another of the lesser-growing species and will take years to attain any size. The true plant is scarce, I believe. It colours well. The berrying capabilities of *B. Wilsonae*, *B. Prattii*, *B. subcaulialata*, *B. aggregata*, *B. brevipaniculata*, *B. vulgaris* and *B. Stapfiana* are tremendous. The thin soil and the closeness of the brash underneath have probably something to do with this.

Of its genus at Westonbirt the most magnificent is *Rhus Potaninii*, also known as *R. sinica* and *R. Henryi*. The tallest plant is over 30 feet high, and seen at its best against a background of *Thuya plicata* it is a sight not easily forgotten. It is bright scarlet. *R. cotinoides* is the next best and makes a wonderful display in favourable seasons. Unfortunately it starts into growth too early for our late springs, and frequently gets all its earliest foliage destroyed, with the result that it gradually weakens and dies. Some large plants have been lost in this way during recent years. *R. copallina* is a fine colouring species, but it is never more than a meagre thing with us. We prefer *R. Osbeckii* (sometimes known as *semialatus*) to *typhina* for its autumn tint, but the variety of *typhina* called *laciniata* is a most glorious shrub; with us it does not grow into such a large bush as the type, and does not sucker so abundantly. Some of the purple-leaved forms of *R. Cotinus* are much more vivid than others.

Euonymus alatus has been planted in masses at Westonbirt and it varies in colour from rose madder to deepest crimson, the two shades frequently occurring on the same plant. These huge groups are generally very much admired. *E. alatus* is a slow-growing species and takes many years to make a good specimen; it should be included in every collection for its autumn beauty. Colouring early and regularly *E. oxyphyllus* is a great favourite of mine. If we had the quantities of this as we have of *E. alatus*, and if large groups were available, they would be just as effective as that fine plant. At present we have only one plant and it will be some time before we are able to plant it on such a large scale; the colour is ruby-crimson. *E. latifolius* and *E. planipes* are handsome in fruit, frequently colour well and attain a good size. *E. sanguineus*, although reputed to be a good autumn-colouring species, is very disappointing; we never get any display from it worth

mentioning. *E. yedoensis*, on the other hand, is very good, but is early, and is usually over before other things begin.

There are many large plantings of *Cornus alba*. At the four corners of cross rides it has been grouped in masses underneath thinly planted Scots pines, which help to show up the wonderful mass of colour below. Not many things thrive near this well-known Conifer, but the Dogwood does not seem to mind it. We cut this *Cornus* to the ground every third year, and generally get the best colour the second year after doing so. *C. Kousa* is very good and with us is more reliable for autumn effects than *C. florida*, although not so bright a colour, being a sort of bronze and quite distinct. A very large plant of *C. Nuttallii*, or at least large for our altitude and temperatures, colours fairly well and is desirable. *C. Baileyi*, of which I saw good plants at Wisley last year, has since been planted by us in a small group to see if it will do as well here.

In the Mountain Ash and Whitebeam section of *Pyrus*, the finest colouring species is *Sorbus hupehensis*, which has been confused with *S. Wilsoniana*, but its berries are white, not red as in *S. Wilsoniana*, and as yet not as freely produced. In this respect it is not so effective as the red-berried species. *S. Esserteauiana* is far and away the finest scarlet-fruited species of this group. Trees between 40 and 50 feet high, with every twig terminated by a 6-inch corymb of its beautiful fruit, which fortunately the birds leave severely alone, are most attractive, especially when the foliage turns a rich yellow, which it does regularly. The berries frequently hang until January. *S. discolor* and *S. rufo-ferruginea* also colour well, but trees of these species are not large enough to fruit yet. *S. Folgeneri* is very desirable, and if planted on rising ground the silvery under surfaces of the leaves are more easily seen. It turns a russety red and is usually much admired. *S. pinnatifida* is another good colouring russety-red species. The Himalayan *S. vestita* with us is perhaps the most effective of this section; its large leaves become a lovely shade of golden yellow, gradually turning to brown. Frequently in December it is the only bit of colour left. It should be on its own root or grafted on the Mountain Ash; trees worked on the White Thorn with us will never be anything but scrubs. *S. Aria* is very good some years and *S. alnifolia* rarely fails.

Of the *Malus* section, *Malus trilobata*, of which we have as yet only small plants, colour magnificently; *M. yunnanensis* and *M. Tschonoskii* are also promising.

As far as colouring and berrying are concerned among the *Viburnums* there is still nothing better than our native *Viburnum Opulus*. Large plants of this loaded with its currant-like fruits against the leaves in a harmonizing tint of red are most appealing, and attract much attention. The imported species most to be relied upon to colour is *V. cassinoides*. This and *V. Opulus* have been badly attacked of late years by leaf-eating caterpillars, and if these are not destroyed quickly they will soon eat every leaf and the plants will be seriously injured. The large-leaved species, *V. alnifolium*, of which we have as yet only one

plant and that a small one, is very promising for autumn colour, but is tantalizingly slow in growing. The Sheep Berry, *V. Lentago*, is very fine some seasons, but is not consistent, though it is a very desirable shrub. *V. prunifolium* is also not consistent, but is worth trying. *V. lobophyllum* is a plant of graceful habit, with bronzy-red foliage and berries like *V. Opulus*, which remain hanging well into the winter.

Of the larger-growing species of Cotoneaster, *C. bullata* with us is exceptionally good both in foliage and fruit. It may not excel *C. rotundifolia* from a berrying point of view, as the habit of the latter of retaining its berries right through the winter makes it the most desirable species of all perhaps. *C. foveolata* promises to be one of the finest autumn-colouring species; its berries are black and are not admired so much as those of the red-fruited forms. *C. Dielsiana* with its orange-scarlet berries is also very beautiful. *C. horizontalis* is too well known to need any comment, and several other species berry well, but have not such good colouring.

Of the Oaks, pride of place must be given to *Quercus coccinea splendens*, known as Waterer's Scarlet Oak, of which there are several fine trees at Westonbirt. The many specimens of *Q. rubra* in the Silkwood are capable of making a splendid display, and this is the best grower of all the North American Oaks. A tree nearly 80 feet high in the Arboretum does not colour so well as smaller specimens in the Silkwood. The Willow Oak, *Q. Phellos*, is a very lovely tree when well coloured. *Q. palustris* is also good in some seasons. *Q. alba* is a bad grower with us, as it is generally I believe, but those we have usually colour well.

None of the Hickories can equal *Carya porcina*. A good tree of this, which unfortunately got its top broken out by a gale a few years ago, is extraordinarily beautiful; the colour is a clear golden-yellow, a deeper shade than anything I know of, and wonderful. *C. alba* is also good, usually rather earlier than *C. porcina*, not such a fine golden-yellow, but still very lovely. *C. amara* at its best is beautiful, but it is not so consistent as either of the preceding.

Enkianthus campanulatus is better in some seasons than others, but is a beautiful shrub. *E. japonicus* has much finer colouring than *E. campanulatus*, and we are planting more of it.

Cercidiphyllum japonicum is perhaps the most elegant and graceful of cultivated small trees; a specimen in the Silkwood is between 30 and 40 feet high and never fails to make a grand display of colour in pink and gold. Several trees which were originally sent by Sir HERBERT MAXWELL have much finer colouring than the type, and in most seasons are carmine-purple and gold, and when seen at their best a sight not easily forgotten. This may be the form on the market known as var. *sinense*. *Cercidiphyllums* have been planted both in groups and individually, and although we are often told that they should be planted by water to get sufficient moisture, we have planted them everywhere and find that they generally succeed. They are, however,

one of the first things to resent drought. One objection to planting by water is this: they start growing too early for our climate, and often the young foliage is destroyed by late spring frosts. It is more liable to suffer in this respect if planted by water.

Stuartia Pseudo-camellia and *S. sinensis* are both nice colouring and desirable shrubs, the latter turning to a purplish shade.

Parrotia persica is another largely planted tall shrub or small tree at Westonbirt. It is variable from a colouring point of view; in 1929 it was a most gorgeous sight, insomuch as we called it a Parrotia year; in 1930 it was indifferent, and last season (1931) was again good but not equal to 1929.

Of *Nyssa sylvatica* there are only small trees; it is slow growing, and it will be a great number of years before we have such fine specimens as those at Kew. Their small size makes no difference to their colouring, however. It is a flaming scarlet.

Photinia villosa is good both for colouring and berrying; it is a deeper colour than the preceding, and it is not happy in limy soil with us.

Fothergilla monticola is the finest of all small shrubs for autumn effects, and is one of the longest-lasting things I know of, frequently going on for weeks. We were supposed to have both species—*F. monticola* and *F. major*. I am told that the latter colours yellow only; as all ours turn scarlet-crimson and gold I am afraid we have only *F. monticola*.

Both *Callicarpa koreana* and *C. purpurea* are good, their purplish shading being very distinct and a change from the brighter-coloured trees and shrubs.

Oxydendron arboreum, which used to be known as *Andromeda arborea* and beloved of rabbits, never fails to give us a gorgeous display of vivid scarlet. It is a very desirable large shrub for the woodland in a lime-free soil.

The best Amelanchier for autumn with us is *A. laevis*. It is also very beautiful in May with its masses of white flowers and pink young foliage. *A. vulgaris* turns to shades of orange; large trees of it can be quite good.

Vaccinium corymbosum is the finest of the genus and *V. ovalifolium* is sometimes good. These love woodland conditions and a lime-free soil, but are not very fast growing.

Stephanandra Tanakae and *S. flexuosa* are very effective if planted in groups. They have deep yellow colouring.

Of the large-growing species of *Prunus*, *P. Sargentii* is quite the best; it varies considerably from year to year. I have never seen it so poor as in 1930. In 1931 it was much better but the leaves fell almost as soon as they coloured. *P. Sekiyama* ("Hisakura" of gardens) often gives nice colour. *P. Conradinae* turns a fine golden-yellow occasionally. The small-growing *P. pumila* and its var. *Besseyi* are both good.

Zelkova crenata and *Z. acuminata* are useful, rather small-growing

trees; they are allied to the elms and, like them, turn to a fine golden-yellow colour.

Encryphia pinnatifolia planted in groups, although not so bright as many things, is desirable because it is usually later in colouring, and thus extends the season.

The Thorns are admired mainly for their berries, but some of them are also fine for their autumn tints. I think the most beautiful of all is still the old *Crataegus prunifolia*, for the foliage turns a deep golden-yellow, against which the red berries show up to perfection. In the autumn of 1930 several large trees presented a magnificent sight. *C. rivularis* is another Thorn, long introduced, which colours well; its berries are black and the foliage turns to a russet red. *C. coccinea* is also very nice. The largest-berried Thorn we have is *C. Jackii*; the fruits are really immense. *C. orientalis* when loaded with its orange-scarlet fruit is always admired. Other large-fruited varieties are *C. Ellwangeriana*, *C. Arnoldiana*, *C. submollis* and *C. punctata*. Many of the newer introductions are very promising for their autumn beauty, but 1930 was too dry and 1931 was too sunless and wet for most of them, so decisions with regard to them must be deferred for a time.

Among climbers there are several vines worth mentioning. The Japanese *Vitis Coignetiae* requires plenty of room, and where this can be provided it is magnificent. It is not consistent; some seasons it is much better than in others. *V. vinifera foliis purpureis* should be planted for its purple foliage. The deep vinous purple is more pronounced in autumn than in summer. *V. Henryana* is not sufficiently hardy with us. *Celastrus articulatus* is another climber requiring plenty of room. It turns to deep yellow, and is very attractive when its berries freely and the berries open and show the orange-red seed as in the genus *Euonymus*.

Xanthorrhiza apiifolia, the American yellow root, is a slow-growing shrub, increasing by suckers; it turns chocolate colour and is not often seen.

Virgilia lutea, which used to be known as *Cladrastis tinctoria*, is a very desirable species. A tree 30 feet high planted amongst sombre conifers is always admired; as its name suggests, it is golden-yellow.

In conclusion, *Syringa formosensis* has reminded me of its claim to recognition; it is very distinct and also desirable, turning chocolate-purple.

CLEMATIS.

By J. L. RUSSELL.

[Read July 19, 1932 ; Viscount ULLSWATER in the Chair.]

BEFORE dealing with the Clematis with which we are so familiar to-day, it may be of interest to mention that there is only one species native to this country—namely, *Clematis Vitalba*, the “Old Man’s Beard” or “Traveller’s Joy,” of which we see so much in our country hedgerows and on our commons.

The first Clematis which reached us from abroad was *C. Viticella* (fig. 127), introduced from Southern Europe in 1569. LOUDON attributes the name of “Virgin’s Bower” to the fact that this species was introduced during the reign of Queen Elizabeth, and in compliment to her was commonly called Virgin’s Bower.

Towards the end of the sixteenth century a few other species found their way to this country, among them *C. Flammula*, *C. cirrhosa*, and *C. integrifolia*, all European.

The next we hear of fresh species is during the eighteenth century, when *C. Viorna* (U.S.A.), *C. orientalis* (Asia), *C. florida* (China), *C. calycina* (Minorca), *C. paniculata* (Japan), and *C. alpina* arrived in this country. *C. alpina* is by some botanists kept in a separate genus and called *Atragene alpina*, owing to a slight difference in the formation of the sepals and stamens as compared with most other Clematis.

Then we come to those of more recent introduction during the nineteenth century, which are really of more interest to us, in that it is mainly from these species that most of our beautiful hybrids of to-day have been derived.

As with many other genera of plants, it is to China and Central Asia that credit must be given for the most useful species—namely, *C. patens*, *C. lanuginosa*, *C. Fortunei*, *C. Standishii*, *C. Davidiana*, *C. tangutica*, and *C. Armandii*; other species were also introduced during the century—for instance, *C. indivisa* from New Zealand, *C. coccinea* from Texas, and *C. montana* (fig. 128) from the Himalayas.

The foregoing, I think, covers all the species that we need interest ourselves in to-day, so far as they are of use from a garden-beautifying point of view, the remaining 200 odd having very little decorative value.

It was in the year 1835 that the first known hybrid was raised by a Mr. HENDERSON at the Pineapple Nursery in Edgware Road, London. Mr. HENDERSON was quickly followed up by Mr. ANDERSON

HENRY of Edinburgh, of whose endeavours we still have an example to-day in the variety called *Henryi*, which even now ranks as a first-class white.

We now come to names with which we are more familiar, such as JACKMAN of Woking, CRIPPS of Tunbridge Wells, NOBLE of Sunningdale, and SMITH of Worcester, all nurserymen, and at one time or another large growers of this beautiful plant, and by them most of the varieties which we grow were raised and distributed.

This is a brief history of the plant as we see it in our gardens to-day.

Now we may turn to the planting, situation, soil, manuring and pruning, etc., best suited to these plants, and to the consideration of a remedy for the dread habit of dying back just as the plant is coming into flower. This has been a source of anxiety and worry, not only to amateurs, but to commercial growers.

I am not in agreement with some who attribute this trouble to grafting, though I agree that increase by cuttings is preferable to grafting. Many plants that have been grafted twelve months are now on their own roots, and it is only this root that increases as the root of the stock eventually dies out.

Whilst speaking of increase by cuttings, internodal cuttings have been considered preferable to nodal, but I can assure you that half-ripened cuttings with a gentle bottom heat to the propagating pit, if they are from inside wood, in May, root fairly readily whether nodal or internodal. Nodal cuttings give a much stronger growth from the bottom eye or base of the cutting. This applies more especially to the Jackmannii hybrids, as with the young plant the top growth dies away and you are almost entirely dependent on the bottom eye.

It is my firm belief that excessive sun is the primary cause of the die-back. You may have noticed that a plant is flourishing in the morning, and by evening it is all withered just as though it had been severed at the bottom. This, you will invariably find, happens after a very hot day and with plants that are exposed pretty much to the sun, and even though the roots are shaded the frail stems are in the full glare.

It may be worth while my mentioning one instance of this dying back. It happened to a plant of *C. Jackmannii*—generally considered to be one of the most vigorous—that was planted about twenty years ago. Regularly for the first three years, just as it was coming into flower, it completely withered, but for the years following, and until to-day, it has been one glorious shower of bloom from the end of July to September. Though I hope that any of you who may plant Clematis in the future may not have to wait three years for the plant to show its beauty, yet I just instance this to show that it is very unwise because a plant has died down unnaturally to dig it up and throw it away. I think it only goes to prove that these plants become more settled and secure as the roots get to a depth of soil that is less affected by variations of temperature and moisture. You may have noticed that the

Traveller's Joy grows amongst other shrubs in our hedgerows and on our commons, and these afford its roots quite good protection from the heat of the sun.

The best time for planting is during September and October, when the plant still has a fair amount of vigour and a little time and inclination to make root. Of course this, like most rules, can be deviated from, provided more care in other directions is taken. For instance, when planting in the spring, it is necessary that the situation be more carefully selected, in that, if planting in a sunny position, every attention to watering is needed; it is also essential that the plant should be shaded by a fairly dense shrub.

Respecting situation, I think undoubtedly the best aspect is west, as in this position the plant gets the direct rays of the sun only part of the day. If planted with an eastern exposure, the young growths in the early spring are apt to get nipped by the frost. Though this is not by any means fatal, it delays the season of flowering with the early varieties, such as those in the *Patens* section and some of those in the *Lanuginosa*, and the flowers are apt to come anything but their proper colour. For instance, some of the whites will have a bluish tinge about them, and some of the mauves even a green tinge. With a southern aspect, unless the roots and bases of the stems are heavily shaded—though not robbed—by dense shrubs, it is by far too hot. Of course, another position in which they will do well is facing north, provided they again have some evergreen shrubs to protect them from the rigours of such an aspect. They can be trained over the top (this, of course, is for a wall of reasonable height) and their beauty displayed on the south side of the wall.

Soil is another very important matter. The best example I can give you as to the soil most suited to these plants is a rich and fairly heavy loam with a chalk subsoil. This is not always the natural soil of our gardens, in which case I would advise digging a hole 2 feet or 3 feet in diameter and 2-2½ feet deep, filling the bottom 9 inches or so with old bricks and mortar or a few old crocks, or anything of a like nature to ensure good drainage, and the remainder with a fairly stiff loam, adding old pounded bricks and mortar. By doing this you will attain that even moisture and temperature of soil which I mentioned as the reason why the plant I referred to eventually flourished after having died back on three occasions.

Having got the plant suited as to situation and soil, the next point to be considered is the manuring. This is best done during the winter, and the best manure to use is somewhat controlled by the nature of the soil in your garden. Should it be of a light and dry nature and, therefore, somewhat warm, use cow manure, but if the reverse, a liberal dressing of well-decayed stable manure, and even a little leaf soil is beneficial. There are, of course, people who may not be fortunate enough to be able to procure either of these manures, in which case the application of a reputable artificial manure in the early spring is the next best thing. For the first year or so after planting

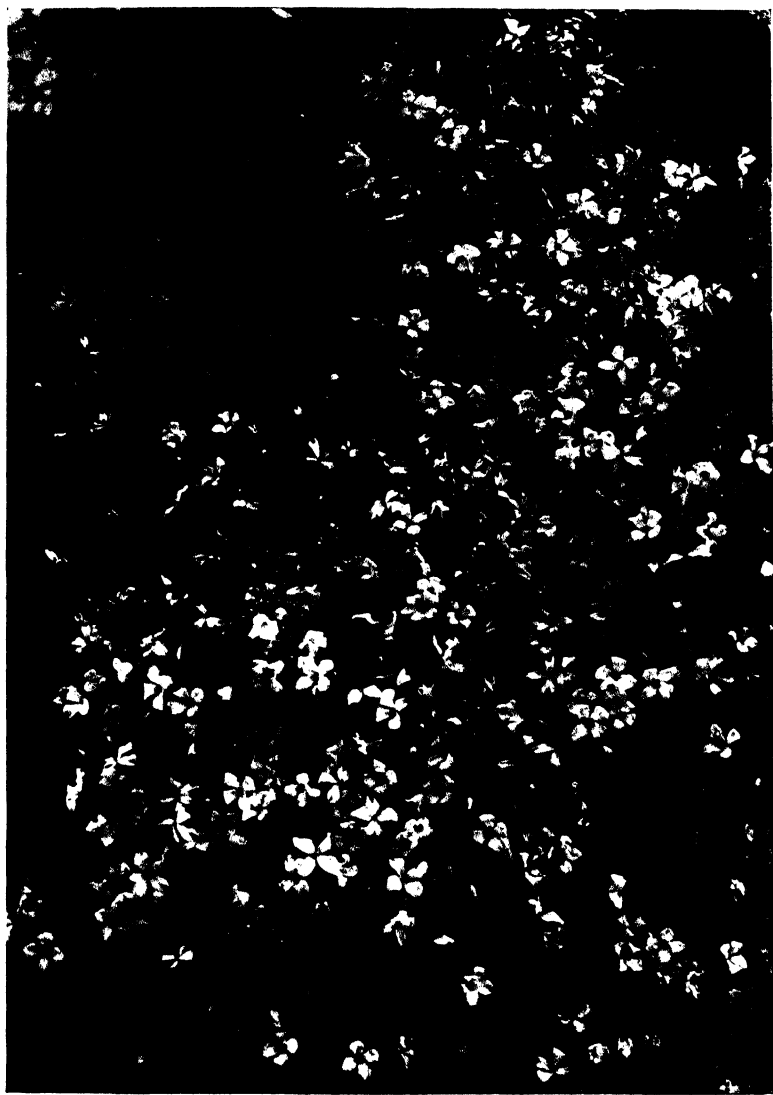


FIG. 127.—CLEMATIS VITICELLA ALBA.

[To face p. 382.



FIG. 128. CLEMENS MONTANA AT CORSHAM COURT.

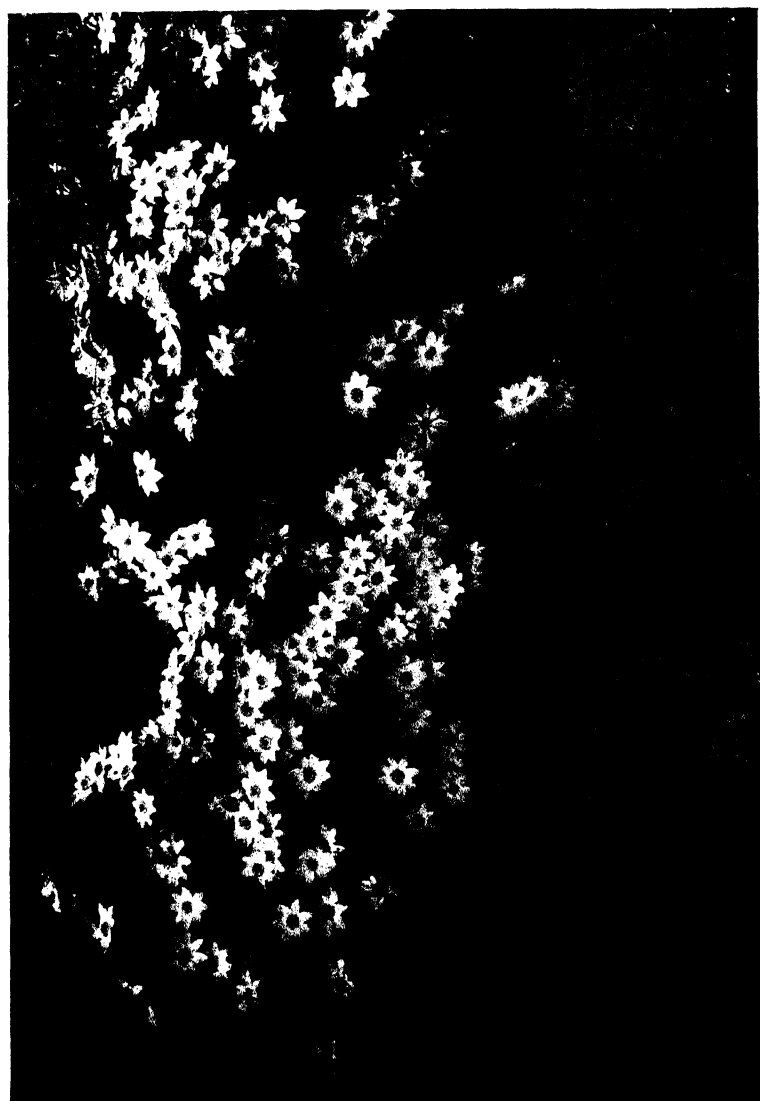


FIG. 129. CLEMATIS ABOVE A ROCK WALL.



FIG. 130.—CLEMATIS MACROPETALA.

[To face p. 383.]

liberal watering during a dry spring will be much appreciated by the plant.

Now we come to pruning, an operation which is confusing to many. I think a deal too much attention is paid to this in the early life of the plant—my meaning being that an enthusiastic amateur buys a plant in the autumn, and the following spring, though it only has a foot or two of growth, is most anxious to set about the pruning. Well, this, I think, should be left alone, at any rate until the plant has been in its permanent situation for one or even two years, for it is well to let it become established before we attempt to prune for the purpose of getting larger or more flowers.

Once having got the plant established, a simple rule to follow is that if the variety belongs to either of the sections flowering in the spring or early summer—namely, *Montana*, *Patens*, *Florida*, and *Lanuginosa*—just shorten back in the spring as the buds begin to show prominence, cutting to a bud that looks healthy and capable of vigorous growth, as it is on the old wood of these that the flower is produced. The *Jackmannii* and *Viticella* sections, which flower on the new season's growth in the summer and autumn, should be pruned during November or when the plant has died down. If they are plants on pillars or tripods—as, for instance, at the back of an herbaceous border—which during the winter and early spring months it is desired should look neat and tidy, they can be cut almost to the ground level, thereby relieving the pillars of all straggly and loose growth; or if they are on a wall or pergola and you are desirous of having the show of bloom rather far from the root of the plant, shorten back to where the stem is of sufficient strength to throw strong shoots next year. By the latter method the bloom can be at a further distance than one year's growth from the base of the plant.

The species can be pruned in much the same way as the large-flowered hybrids I have already mentioned, according to whether they are spring or summer flowering.

Some notes on the different varieties may be of value; but perhaps before dealing with the large-flowered hybrids I ought to mention a species of comparatively recent introduction. This is *C. Armandii*, which has given us one or two charming hybrids all of which have been generally considered to require a certain amount of protection in the winter, but I know of several plants which stood the frost of 1929 outside with very little damage.

The hybrids of *C. Armandii*, so far as I know, are entirely free of the habit of dying back and, unlike the others, demand a place in the full sun. They have fine noble foliage of a tough, leathery texture, with the additional advantage of being evergreen. The flowers, which are about the size of *C. montana* but of rather more substance, are produced on long stems in heavy clusters. *C. Meyeniana* and 'Snowdrift' are hybrids of *C. Armandii*, and are also white, though the individual flowers are larger, but I think the best of all is 'Apple Blossom,' a variety which gained an Award of Merit in 1926. As the name implies, prior

to the buds bursting they have a decided pink tinge resembling apple blossom, and this mingled with some of the more advanced fully open blooms makes it altogether a very charming plant. When better known it will become quite as popular as, if not more so than, the large-flowered hybrids we know so well.

We have only one species of any decorative value that is essentially a greenhouse climber, and that is *C. indivisa lobata*, a really charming plant of bright, glossy foliage, and evergreen. It is invaluable for its profusion of white flowers prominently displayed in May on stiff stems in large clusters.

Another species worth growing is *C. alpina*, which, with the exception of *C. calycina* and *C. cirrhosa*, is the earliest of the genus to flower. It bears rather small, nodding flowers of a charming azure-blue shade, appearing in early April and May.

Of the large-flowered hybrids the following I consider most deserving of your attention.

Starting with the Patens group, these being the earliest bloomers, mainly flowering during May and June, though some varieties carry on much longer, we have :

‘Édouard Desfosse,’ a deeply shaded mauve, and one which I would put in the first six of Clematis for general purposes.

‘Lady Londesborough,’ silvery grey with pale mauve bars.

‘Lasurstern,’ rich purplish blue ; and if I had room for one Clematis only it would be this.

‘Miss Bateman,’ a medium-sized white with chocolate stamens.

‘Mrs. George Jackman’ (fig. 131), probably the best of all the whites.

‘President,’ rich purple.

‘Sir Garnet Wolseley,’ bluish with plum bars.

The Lanuginosa hybrids are what we might call the mid-season varieties, as these, in the main, flower from June to September. The following are some of the best :

‘Beauty of Worcester,’ a lovely bluish violet.

‘Crimson King,’ as the name implies, a bright crimson ; of rather fickle growth until well established.

‘Empress of India,’ bright reddish flowers, and a really good grower.

‘Fairy Queen,’ pale flesh with pink bars, and one of the largest-flowered varieties.

‘Lady Caroline Neville,’ French white with mauve bars—a variety I can thoroughly recommend.

‘Lady Northcliffe,’ a really beautiful deep lavender, but unfortunately rather prone to dying back.

‘Lord Neville,’ rich dark plum colour ; a good grower and free bloomer.

‘Nelly Moser’ (fig. 132), an old favourite ; white tinted pink with carmine bar ; and

‘Marcel Moser,’ rather similar but of a slightly darker shade ; both of these being trustworthy varieties.

'Marie Boisselot,' a splendid white of vigorous growth.

'Princess of Wales,' bluish mauve; another good grower.

'The Gem,' with lavender-blue flowers of exceptional size; a good grower, but not so floriferous as some—no doubt due to the size of the flower.

'William Kennett,' deep lavender.

'W. E. Gladstone,' large, beautiful lilac.

Next we have the Jackmannii hybrids:

'Comtesse de Bouchaud,' a charming shell pink.

'Gipsy Queen,' bright velvety purple.

'Jackmannii,' which all know.

'Madame Édouard André,' bright velvety red.

'Mrs. Cholmondeley,' a splendid pale blue.

'Snow White Jackmannii,' pure white.

The *Viticella* hybrids are rather similar in growth to the Jackmannii, as it is on the current season's wood that they flower in the late summer and autumn, and are mostly of strong and vigorous growth:

'Daniel Deronda,' a good purple with lighter bar, often producing double flowers on an old-established plant.

'Duchess of Sutherland,' a splendid bright red.

'Lady Betty Balfour,' a deep velvety purple; the rather large and well-shaped flowers freely produced on its vigorous growth, making this an all-round first-rate variety.

'Ville de Lyon,' carmine red; one of the best of its colour.

Viticella alba luxurians, a charming white, resembling more closely the type (fig. 127) in its small flowers than those previously mentioned, which have little to identify them with *Viticella* except in their season of flowering and vigour of growth, the flowers being more the shape and size of the *Lanuginosa*.

The double or Florida hybrids are not so numerous, the best being:

'Belle of Woking,' a very full double silvery grey.

'Countess of Lovelace,' bluish lilac, also very double and rosette-like.

'Lucie Lemoine,' a good white.

'Venus Victrix,' a charming delicate lavender, not quite such a full double.

Of the *Coccinea* hybrids, perhaps rather less known, but nevertheless of somewhat striking beauty for their nodding, bell-shaped flowers, the best is:

'Sir Trevor Lawrence,' a splendid bright carmine. Good seconds to this are:

'Admiration' and 'Grace Darling,' both of a carmine to carmine-rose shade.

All the hybrids which I have so far mentioned, with the exception of *C. Viticella alba luxurians*, are large-flowered, and it is here that I think I ought to draw attention to the small-flowered varieties which are so well adapted for the wild garden or woodland planting, as it is more in

keeping to see these varieties rather than the large-flowered in such surroundings. A few of the best are :

‘Madame Jules Correvon.’

C. montana grandiflora.

C. montana rubens.

C. Flammula rubra marginata.

‘Kermesine.’

C. Viticella rubra grandiflora.

C. tangutica obtusiuscula.

C. Flammula and *C. paniculata.*

The last two, though not so pleasing to the eye, have a very delightful scent.

It is with these varieties that I think the best wild garden effect can be obtained, rambling amongst the trees or over old tree stumps, or clinging to anything that they find within their reach.

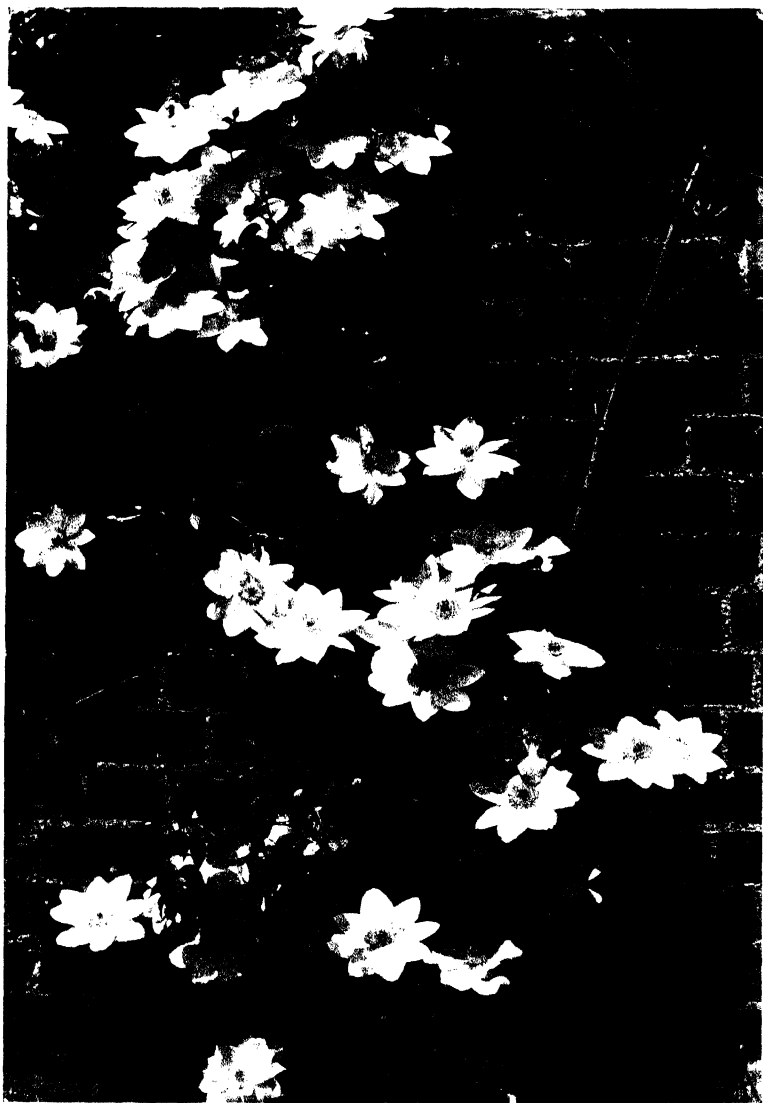


FIG. 131.—CLEMATIS 'MRS. GEORGE JACKMAN.'

To face p. 386.



FIG. 132.- CLEMATIS 'NELLY MOSER.'



FIG. 133. CLEMATIS AND ROSES.



FIG. 134. --CLEMATIS SIEBOLDII.



FIG. 135.—ANTIRRHINUM 'DAWN O' DAY.'
(p. 390)



FIG. 136. GODETIA, CLIMSON GLOW
(p. 391)



FIG. 137. — *HELIOPHILA LEPTOPHYLLA*.
(p. 392)



FIG. 138.—LARKSPUR, EMPEROR TYPE.
(p. 392)

[To face p. 387.

ANNUALS.

By J. M. BRIDGEFORD.

[Read February 7, 1933 ; Mr. W. R. OLDHAM in the Chair.]

MY subject to-day will be confined to Annual Flowers, their treatment, selection and, as far as time will admit, suggestions as to the best in their particular class. I shall try to make comparisons of old types with improvements through hybridizing and selection, and to refer to some of the newer varieties introduced of late years.

Annuals can best be defined as plants grown from seed blooming and ripening in the same year. There are also many plants called Biennials which verge very closely on Annuals and can be treated very successfully as such. A few of these I propose including in my remarks.

To grow Annuals with any degree of success several points must be borne in mind. The seed must not be sown too thickly, and care must be taken that thinning out is done at an early stage of their growth and that they are not allowed to get drawn and weakly through overcrowding ; this, I am sorry to say, is too often the case, causing much disappointment. The thinning process should be done gradually as the plants develop. By the time the seedling plants are well established they will then have plenty of room for each individual to attain its natural size.

The distance to be left between the plants will, of course, vary according to the habit and height of the particular plant when fully grown. A very good plan is to allow plants growing, say, 1 foot in height when fully grown the same distance between the plants. In this way a good specimen can be procured, and it well repays the trouble. Grown more thickly together one cannot get the best results. Tall Annuals growing to a height of 5 to 6 feet should have about 3 feet between them.

There are many Hardy Annuals which, to get the best results, should be sown in the open in the autumn—say September or October—such as Cornflower, Larkspur, etc., etc. When treated in this way care should be taken to avoid growing in damp heavy soil. The final thinning should be left till the early spring, after the ravages of the winter have spent themselves.

Annuals, whether sown in spring or autumn, should not be sown in very rich soil, as the tendency there is for such plants to grow too strong in foliage, with little flower. The free use of the hoe is better than all manures.

I have spoken so far respecting Annuals which are better sown in the open, but many, a great many, are better sown in pots or flat boxes under cold frames, and some under frames with a little heat,

INTERMEDIATE OR SEMI-DWARF VARIETIES.

BEACON, salmon rose; CHERRY RIPE, terra-cotta red; DAZZLER, bright scarlet; MADONNA, white; PRIMROSE MONARCH; ADVANCE, orange scarlet with white throat; CHARM, rich rose; GOLDEN MONARCH; MALMAISON, silvery pink; FLAME, orange scarlet; BLACK PRINCE, dark crimson; ROSABELLE, rich carmine rose; VICTORY, terra-cotta orange.

The BEDDING TYPE can be had in colours ranging from dark crimson to white, and the TOM THUMB in similar colours; and now the latest development:

*THE MAJESTIC TYPE.

Plants about 18 in. high with very large flowers on symmetrical Hyacinth-like spikes. ELDORADO, golden yellow; RED CHIEF, deep scarlet; TWILIGHT, delicate apricot; ORANGE KING, rich terra cotta; DELIGHT, delicate salmon pink; AVALANCHE, pure white.

*ANTIRRHINUM TOM THUMB PINKIE (New). Rosy pink (fig. 135, type).

'Pinkie' is a charming dwarf compact variety, 6 to 7 inches in height, giving practically 100 per cent. true plants from seed.

ANTIRRHINUM ROCK HYBRIDS.

A new class of Antirrhinums which has come into popular favour lately, and rightly so, as it contains many fine colours, including rose, pink, orange, crimson and mauve varieties very decorative in rock and alpine gardens, blooming, as they do, during the summer and autumn months and brightening the rock garden at a time when most other rock plants are past their flowering stage. These hybrids are a cross between *A. majus* and *A. glutinosum* and grow to a height of about 6 $\frac{1}{2}$ to 8 inches.

*ARCTOTIS BREVISCAPA AURANTIACA.

A deep and most attractive shade of orange yellow, with purple disc. Good for cutting.

*ASTERS.

Including 'Comet,' 'Eclipse,' 'Ostrich Plume,' 'Victoria,' 'Hercules,' 'Pæony-flowered' and 'Single Sinensis.'

*BROWALLIA VISCOSA COMPACTA SAPPHIRE.

A new compact form, 9 to 10 inches in height, dark blue flowers with white eye, suggesting a large-flowered Lobelia. Good for conservatory decoration. Another fine variety is 'Speciosa Major,' flowers large blue, fine winter-flowering species.

CALENDULA SUNSHINE (New).

A distinct type, bright golden canary yellow, rather taller than most varieties. Good for cutting.

ORANGE KING.

Large, pure glowing orange, still the best of its type.

RADIO.

Orange quilled petals, smaller flowers than 'Orange King.' Distinct.

GOLDEN BALL.

Fine golden yellow, a good companion to 'Orange King.'

CALLIOPSIS TOM THUMB DAZZLER.

Maroon red, golden yellow border, larger flowered than 'T.T. Beauty'—12 inches.

BEAUTY.

Golden yellow with crimson centre, very effective—8 inches in height.

SULTAN.

Rich maroon crimson, flowers as large as 'Dazzler.'

Coloured slides illustrating these were exhibited.



FIG. 139. - LINARIA DWARF FAIRY BOUQUET.
(p. 392)

[To face p. 390.]

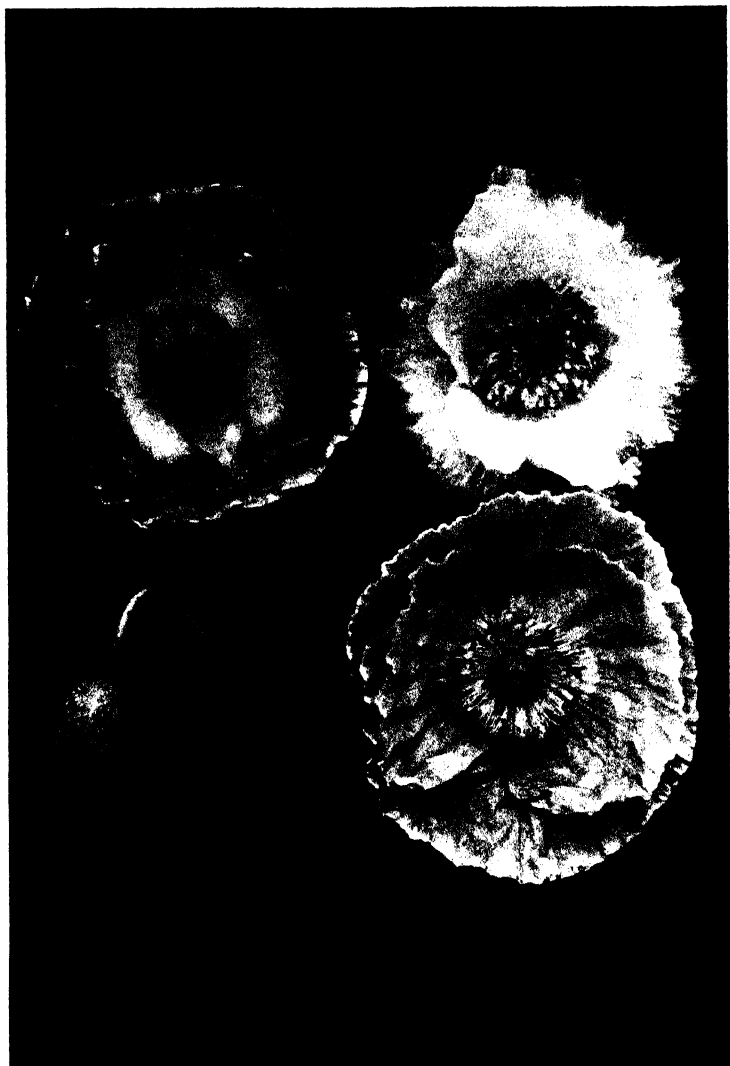


FIG. 149. -SHIRLEY POPPIES.
(p. 393)



FIG. 141.—*URSINIA PULCHRA*.
(p. 394)



FIG. 142.—VISCARIA 'BLUE BOUQUET.'
(p. 395)

[To face p. 391.

***CANDYTUFT GIANT HYACINTH-
FLOWERED WHITE.**

Other varieties to be recommended are :

ROSE CARDINAL.

Deep rosy cardinal, a rich striking colour.

DWARF LARGE-FLOWERED HYBRIDS.

Several colours, including rose, crimson, lilac, white, white shaded rose. Plants compact and flowers large.

CENTAUREA IMPERIALIS.

In many colours, including rose, lilac, purple, white, white shaded rose, etc. Good for cutting.

***CHRYSANTHEMUM INODORUM
SNOWBALL.**

A fine double white flower, suitable for cutting.

CLARKIA ELEGANS FL. PL.

A very important annual, of which there are many very fine varieties, including: ORANGE KING, bright orange scarlet; QUEEN MARY, lovely rose carmine; ROSY MORN, beautiful rose pink; DOROTHY, brilliant rose, colour of Dorothy Perkins Rose; MAUVE QUEEN, fine bright mauve.

COSMEA, EARLY-FLOWERING VARIETIES.

Crimson, lilac, pink, white. Fine for garden decorations or cutting. The double-flowering varieties of similar colours are also well worth growing.

FAIRY QUEEN.

A smaller-flowering type growing about 2½ feet, compact in habit. Colour a bright carmine rose.

DELPHINIUM BLUE GEM.

A much improved 'Blue Butterfly,' rich deep blue, compact habit.

AZURE FAIRY.

Cambridge blue, similar in habit to former.

***DIANTHUS HEDDEWIGH.**

Dwarf and compact. Pure white with crimson eye, large flower.

*SUPERBISSIMUS.

Flower very large, of various colours. Petals have a curious crested surface, giving a handsome and striking flower, probably the best of the singles. There are many others of proved worth, including several double forms—'Pink Beauty'; 'Purity,' double white; 'Lucifer,' double scarlet; and others.

***DIMORPHOTHECA PLUVIALIS VAR.
RINGENS.**

A beautiful, easily grown annual about 6 inches high. Flower glistening white, with blue zone. Extremely free flowering. Requires a sunny situation. Other varieties of proved worth are *D. calendulacea* 'Lemon Queen,' brilliant lemon-coloured flowers with black central zone, and *D. calendulacea* 'Mixed,' various colours such as salmon, buff, yellow and white.

**ESCHSCHOLZIA COMPACTA CAR-
MINE KING.**

A rich carmine colour; also a double form of this variety.

*COMPACTA MIKADO.

Orange crimson.

*CANALICULATA RAMONA.

Friiled golden bronze, coppery rose outside.

*ORANGE KING (New).

Deep orange, very large flower.

COMPACTA MOONLIGHT (New).

A charming light chrome yellow, with metallic green foliage.

***GODETIA RUBICUNDA.**

A variety of early days.

CRIMSON GLOW (fig. 136).

Intense dazzling crimson, compact habit.

Coloured slides illustrating these were exhibited.

Other good varieties are :

FIRELIGHT.

WHITE SWAN (New).

LAVENDER GEM.

SYBIL SHERWOOD (New).

Similar in colour to 'Crimson Glow,' but a taller grower.

The purest white Godetia yet introduced. Large flowered.

A beautiful new shade in Godetias, a clear lavender, the glint of which is enhanced by a paler centre, with black anthers. 18 inches in height, excellent for borders.

A novelty of sterling merit. Colour a bright salmon pink, softened by an indefinite edging of white. Strong grower and free flowering. Good for border work and for cutting.

The following are dwarf double-flowering varieties :

WHITNEYI AZALEA-FLOWERED.

Soft rose pink, with deep crimson blotch.

WHITNEYI FL. PL. SWEETHEART.

A lovely bright cream pink.

Taller varieties growing about 2 feet are excellent for borders or cut bloom. Of these I suggest the following double-flowered varieties :

GRANDIFLORA FL. PL. BRIGHT CRIMSON.

GRANDIFLORA FL. PL. CARMINE.

GRANDIFLORA RICH PINK, LILAC.

SCHAMINII ROSY MORN.

HELIOPHILA LEPTOPHYLLA (New) (fig. 137).

A lovely coral pink.

An excellent annual both for growing in pots and for attractive border decoration.

LARKSPUR (fig. 138). Of many fine varieties probably the best are :

STOCK-FLOWERED EXQUISITE PINK.

STOCK-FLOWERED ROSY SCARLET.

GIANT IMPERIAL BLUE SPIRE.

GIANT IMPERIAL LILAC SPIRE.

GIANT IMPERIAL WHITE SPIRE.

LAVATERA SPLENDENS SUNSET (or LOVELINESS).

*LINARIA DWARF FAIRY BOUQUET (New) (fig. 139).

A charming soft pink variety.

A fine deep colour.

A very fine type, upright base-branching habit, large flowers.

Deep rose pink, very fine. The white variety *L. splendens alba* is also good. Plants about 8 inches high, very compact habit, larger flowering than the type, in many distinct colours, such as rose, yellow, pink, lavender, carmine red, salmon, violet, white. Very free flowering.

Very choice mixture of many colours.

*HYBRIDA EXCELSIOR. Taller growing.

LOBELIA COMPACTA BLUE GOWN.

Clear deep blue, without eye. Very compact and free flowering.

Other good varieties are :

COMPACTA MRS. CLIBRAN.

SAPPHIRE.

Very deep blue, with white eye.

Deep blue, white eye, trailing habit.

Very useful for balconies, flower stands and hanging baskets.

Cobalt blue, white centre, large flower.

Very suitable as a pot plant or for summer bedding.

MARIGOLD GUINEA GOLD.

A very distinct type of Marigold, of graceful pyramidal habit, growing 2 to 2½ feet high. Flowers a brilliant shade of orange flushed with gold. Produces no single flowers, but 100 per cent. semi-double. The characteristic Marigold odour is much less pungent than in other Marigolds. Very free flowering. Early sowing is recommended. A very desirable annual.

*TENUIOR COMPACTA.

Other good varieties are :

- *MARIGOLD FRENCH DWARF GOLDEN BALL.** Fine golden yellow, dwarf and compact.
- FRENCH DWARF GRANDIFLORA.** Striped flowers as large as the finest Tall Scotch, with the habit of the French Dwarf.
- *FRENCH TALL GOLD STRIPED SCOTCH.** Flowers large and beautifully striped.
- MIGNONETTE MACHET GOLIATH.** Enormous spikes of double red flower.
- MACHET ORANGE QUEEN.** Large spikes, beautiful orange red.
- MACHET ROBUSTA.** A much improved type of the original Machet. Paler colour than foregoing.
- *NASTURTIUM QUEEN OF TOM THUMBS, ORIGINAL VARIETY.** Flowers bright crimson, variegated foliage. A sport from 'Empress of India.' Now producing about half a dozen other colours, and about the same number of tall varieties. All are fixed and come true.
- *GOLDEN GLEAM (New).** A new and distinct type. Large golden-yellow flowers, semi-double, very effective. Should be grown in light soil, otherwise liable to run to foliage. A valuable addition to our list of annuals, this originated in Mexico. Other colours are likely to be available soon. Slightly sweet scented.
- NEMESIA STRUMOSA SUTTONII.** Original type (now much improved).
- STRUMOSA COMPACTA TRIUMPH.** A cross between *N. Suttonii* and the old small-flowered hybrids. Dwarf and compact, with great variety of colours in mixture.
- COMPACTA BLUE GEM.** Beautiful Forget-me-not blue, fine for bedding.
- COMPACTA FIRE KING.** Bright scarlet.
- *NICOTIANA CRIMSON BEDDER.** Plants dwarf, of pyramidal habit, about 15 inches in height, flowers rich deep crimson.
- NOLANA LANCEOLATA.** A low-growing, rather spreading plant, with *Convolvulus*-like flowers of a beautiful sky blue with white centre. Seed of this was introduced to this country by Mr. Clarence Elliott.
- SWEET PEAS.** One of the most popular annuals, but too big a subject to deal with here.
- PETUNIA GRANDIFLORA SUPER-BISSIMA.** Very large flowers beautifully veined.
- GRANDIFLORA IDEAL.** A dwarf form of *P. superbissima*, very large flowers; 12 to 15 inches.
- GRANDIFLORA TRIUMPH PINK.** Beautiful fringed flowers of a lovely bright pink.
- *BEDDING VARIETIES, ROSE QUEEN.** I recommend the Queen type, rose, lavender, white, silver lilac, violet. Compact and very free flowering.
- PHLOX DRUMMONDII NANA COMPACTA.** In various separate colours and mixture. Are similar to the well-known grandiflora type, but more compact habit. Best for bedding purposes.
- POPPY THE SHIRLEY (fig. 140).** Still one of the best; in charming mixture of colours. Can also be had in separate colours.
- DOUBLE-FLOWERED ELDERADO.** Double form of Shirley Poppy.
- DOUBLE BEGONIA FLOWERED.** In mixture.
- DOUBLE DAZZLER.** Bright orange scarlet, showy.
- *SALPIGLOSSIS EMPEROR.** Large flowers, wide range of colours and in mixture. Plants of upright habit.

Coloured slides illustrating these were exhibited.

***SALVIA SPLENDENS HARBINGER.**

The best of the *S. splendens* type, fine form and very early, a great asset in such a climate as ours.

***SCABIOUS DWARF DOUBLE CORAL ROSE (New).**

Fine deep coral rose with a tinge of salmon. Plant compact, height 8 to 10 inches.

TALL AZURE FAIRY.

Rich pale blue, large flower.

TALL FIRE KING.

Rich rosy crimson, very intense colour.

TALL LOVELINESS.

Various tones of soft delicate salmon rose.

TALL PEACH BLOSSOM.

Peach-blossom pink, large flower.

TALL SHASTA.

Pure white flowers, very large.

***SCHIZANTHUS GRANDIFLORUS MAXIMUS.**

Fine large flowers with brilliant colouring.

***WISETONENSIS EXCELSIOR.**

Dwarfer habit than 'Maximus,' in beautiful mixture of bright colours.

WISETONENSIS PINK PEARL.

Most suitable for growing in pots. Glistening white, rosy pink margin to petals.

WISETONENSIS SNOWFLAKE.

Pure white flowers, beautifully fringed.

STOCK TEN-WEEK MAMMOTH or NICE TYPE.

Excellent either for spring or autumn cutting. Grow to a great size with numerous spikes of bloom.

The best in this class are :—

BEAUTY OF NICE.

Delicate shade of flesh pink.

CANARY YELLOW.

Beautiful clear canary yellow.

CRIMSON KING.

Brilliant fiery scarlet.

LIGHT BLUE.

Good clear light blue.

HEATHAM BEAUTY.

Rose mauve shaded terra-cotta.

NUIT D'ÉTÉ (SUMMER NIGHT).

Rich royal purple.

OLD ROSE.

A lovely shade.

ROSE OF NICE.

Beautiful rosy mauve.

SNOWDRIFT.

Pure snowy white.

PARMA VIOLET.

Beautiful lilac.

If a dwarf type is required for bedding, the LARGE-FLOWERED TEN-WEEK, which can be had in twelve or more distinct colours, should be used.

SWEET WILLIAM ANNUAL.

Grows about 9 inches in height, flowers of good size, well marked. Should be sown in the early spring, February to March, to ensure bloom in the early autumn.

**TAGETES SIGNATA PUMILA. }
SIGNATA GOLDEN GEM. }**

Old and new for comparison.

URSINIA PULCHRA (New) (fig. 141).

Most attractive and useful of the many species from South Africa. Dwarf bushy habit, ideal for bedding or pots. Rich orange yellow with a beautiful ring of deep purple. Fine for garden decoration.

ANETHOIDES.

VENIDIUM FASTUOSUM.

A half-hardy South African annual which can be grown either outdoors or under glass. Grows 2 to 3 feet in height, with long serrated leaves and flowers 3 inches across of a most brilliant orange with black centre and black-purple zone. Should be sown under glass in March for summer flowering out of doors.

VERBENA ROYAL BOUQUET.

Plants 15 to 18 inches in height, upright growth, large flowers in beautiful mixture. Requires no pinning.

COLOSSEA (New).

Large umbels of bloom, flowers over 1 inch across. Various colours.

* Coloured slides illustrating these were exhibited.

VERBENA ETNA.

ROSE QUEEN.

SCARLET QUEEN.

SNOW QUEEN.

VISCARIA BLUE BOUQUET (New)
(Fig. 142).ZINNIA ELEGANS ROBUSTA GRANDI-
FLORA.

ELEGANS DAHLIA-FLOWERED.

ELEGANS DWARF LILLIPUT GEM.

Large trusses of intense 'Paul Cram-
pel' Geranium red with creamy
yellow eye. Very large flowers.

Delicate rose, large flowers.

Vivid scarlet flowers, large white eye,
fine bedding sort.

Giant flowers of a pure snowy white.

Flower a beautiful shade of blue, plant
of upright habit, a great improvement
on the old type, which is of straggling
habit.

In many separate colours ranging from
crimson to white, the best of its type
perhaps. Not so large as the newer
'Dahlia-flowered' varieties, but the
flowers are more refined.

In many exquisite colours, flowers
very large.

Yellow, lilac, orange, scarlet and white ;
forms bushes 1 foot in height, covered
with miniature double flowers.

FRUIT TRIALS AT WISLEY: SOME NEW APPLES.

By A. N. RAWES, Fruit Experiments Officer.

'BUSHEY GROVE.'

RAISED by Mr. J. T. GOOD in 1897, at Bushey, Hertfordshire. Parentage unknown, said to have been raised from a dessert apple pip. **A.M.** January 1922.

Dual purpose: culinary, and for dessert after December; season October to March.

Fruit large to very large, round conical, somewhat angular with slight ribbing; broad, flattened at base. Colour yellow-green, flushed and heavily striped red. Skin smooth, rather greasy. Flesh white, soft, juicy, sub-acid. Eye closed or nearly closed, segments stout, forming a cone, margins usually touching, set in a moderately deep, broad and slightly puckered basin. Stem short, stout, woody, in a deep, wide cavity which occasionally is somewhat russeted. Core medium, cells abaxile. Tube long, rather broad, conical; stamens medium.

Acid; cooking qualities good. Small fruits of moderate dessert quality after Christmas.

Growth vigorous, making an upright, spreading, compact tree.

Leaf large, round oval, dark green, slightly turned under, coarsely serrate. Petiole long, stout; stipules medium, broad.

Shoots (winter) stout, of medium length, brown with purple tinge and much short, grey woolly down and scarf skin. Lenticels many, conspicuous, variable in shape and size, usually large, round.

Wood buds large, rounded, much pubescent, little red colour showing through downy covering. Fruit buds medium to large, ovate, stout, red-brown, somewhat hairy; outer scales rather loose.

Blossoming second-early. *Inflorescence* five- to seven-flowered, stiff, crowded. *Pedicels* long, stout. *Flower buds* pale with pink flush and veined carmine. *Flowers* medium to large, nearly flat, with pink-purple flush and red with carmine veining on white base. *Sepals* long, held out, very little reflexed, downy. *Petals* usually overlapping, variable, irregular, oval, apex bluntly rounded, base tapering; margin entire, slightly undulating, upper surface with distinct central ridge; claw long, stout.

Stamens medium length; anthers usually a little below level of stigmas. *Style column* short, less than one-third total length; little downy at union.

Very fertile; has cropped heavily over several years, but very subject to scab. This variety is not recommended as possessing qualities superior to many others.

‘ELLISON’S ORANGE.’ (Fig. 143.)

Raised by the Rev. C. C. ELLISON, of Bracebridge, by crossing ‘Cox’s Orange Pippin’ and ‘Calville Blanche.’ Introduced by Messrs. PENNELL in 1911. **A.M.** September 1911; **F.C.C.** October 1917.

Dessert, September to October. Flavour more pronounced in some districts than in others.

Fruit medium, conical or almost round, little flattened at tip and base, regular in outline. Colour golden yellow with crimson flush and stripes, dull on shaded side. Skin smooth, occasionally with faint russet veining. Flesh creamy yellow, moderately firm, juicy, of fair distinctive flavour. Eye nearly closed, segments semi-erect, tips reflexed, margins almost touching, set in a rather shallow and slightly puckered basin. Colouring often continued into the basin. Stem long, slender, protruding well beyond a narrow, russety cavity. Core medium, cells obovate, abaxile. Tube small, conical, shallow; stamens medium.

Growth moderately vigorous, making fairly upright compact tree.

Leaf light green, of medium length, rather narrow, pointed, somewhat upfolded, boldly crenate. Petiole medium, rather slender; stipules short and narrow.

Shoots (winter) of moderate thickness, often slender and “whippy,” pubescent, with much scarf skin. Lenticels many, large, conspicuous, elongated.

Wood buds small to medium, usually completely covered with much pubescence exposing only small area of dark red colouring. Fruit buds short, stout, ovate, pubescent, scales tightly wrapped. Bourse rather swollen, rather long; lenticels inconspicuous.

Blossoming mid-season. *Inflorescence* six- to eight-flowered, rather crowded. *Pedicels* long and slender, somewhat downy, green with brown tinge. *Flower buds* pink to carmine. *Flowers* of medium size, cupped. *Sepals* fairly large, length exceeds twice the width, tapering, reflexed. *Petals* slightly overlapping, pale, veined pink-purple; reverse more deeply veined, ovate; margins even, entire, upper surface somewhat concave; claw fairly long, stout.

Stamens erect at base, spreading at upper half. *Style column* short, one-third or less of total length; downy at union, sparsely downy above.

Very fertile; has cropped very heavily. This variety is now widely planted in commercial orchards and gardens and is to be recommended as a valuable addition to mid-season dessert apples.

‘MILLICENT BARNES.’ (Fig. 144.)

Raised by Mr. N. F. BARNES, Eaton Hall, Chester, by crossing ‘Cox’s Orange Pippin’ and ‘Gascoyne’s Scarlet.’ Sent for trial in 1923.

Dessert, November to January.

Fruit medium, conical, rounded, sometimes a little irregular and slightly ribbed. Colour, almost covered with bright red or crimson flush, the high colour usually extending round the eye; shaded side lemon yellow. Skin smooth, shining. Flesh creamy white, crisp, juicy, sub-acid; flavour not pronounced. Eye almost closed, segments converging, reflexed at tip, in moderately wide, little sunken and slightly plaited basin. Stem rather short, sometimes very short and knobbed, usually just protruding from deep and narrow cavity which is evenly lined with russet. Core small, cells roundish, axile. Tube conical; stamens medium.

Growth vigorous, semi-erect, somewhat spreading.

Leaf medium, deep green, elliptical to oval, with long tapering tip generally a little twisted; coarsely shallow crenate, often doubly crenate. Petiole stout, medium length; stipules narrow, rather short.

Shoots (winter) long, slender and "whippy," chocolate brown, little pubescent. Lenticels few, elliptical, fairly conspicuous, pronounced at base of shoot.

Wood buds large, chestnut brown, covered with much pubescence. Fruit buds moderately large, longer than wide, chestnut or reddish, pubescent.

Blossoming rather early—a little before 'Cox's Orange Pippin.' *Inflorescence* six- to nine-flowered, rather crowded. *Pedicels* fairly long, slender, densely pubescent. *Flower buds* pale, white or flushed pink and carmine veined. *Flowers* large, flat, pale, white with faint pink-purple flush; reverse side with darker patches of reddish purple. *Sepals* very long, tapering, downy, much reflexed. *Petals* often overlapping, ovate oval, bluntly rounded apex; claw long and stout, tapering from petal base; upper surface downy.

Stamens rather short, erect; anthers a little below stigmas. *Style column* stout, short, and less than one-third of total length; sparsely covered with short down; above union downy.

Very fertile; cropped heavily and regularly. This variety lacks the distinctive flavour and dessert qualities of many varieties of similar type and season, but possesses characters which may prove it to be a useful variety for commercial growing.

'A. W. BARNES.' (Fig. 145.)

Raised by Mr. N. F. BARNES, Chester, by crossing 'Gascoyne's Scarlet' and 'Cox's Orange Pippin' in 1902. Sent for trial in 1923.

Culinary (small fruits of fair dessert quality), October to January.

Fruit large, round and little flattened. Colour bright, crimson flush and stripes covering most of fruit; shaded side greenish yellow, turning mellow yellow when mature. Skin smooth. Flesh greenish white, crisp, juicy, little acid, with good cooking qualities. Eye almost closed, segments broad at base, tapering, reflexed at tip, margins nearly touching, set in basin of medium depth. Basin

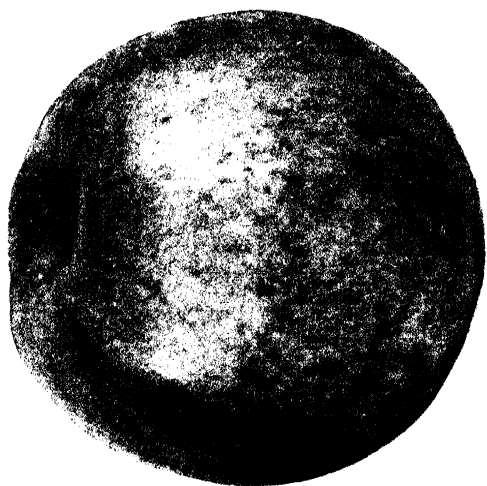


FIG. 143 APPLE 'ELLISON'S ORANGE.'
(p. 397)



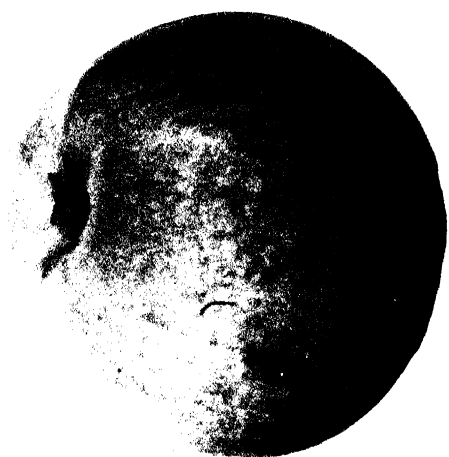


FIG. 144.—APPLE 'MILICENT BARNES.'
(p. 397)



very little puckered and often coloured. Stem long, stout, woody, downy, protruding beyond wide cavity. Cavity little russet, often coloured. Core large, cells obovate, axile. Tube large, funnel-shaped ; stamens marginal.

Growth vigorous, making large, round-headed spreading tree.

Leaf large, deep green, oval ; tip acute to acuminate, sometimes tapering, little upturned ; margin variable, crenate with long shallow crenations, often giving semi-entire appearance. Petiole very long, stout ; stipules long, narrow.

Shoots (winter) long, stout, dull chestnut brown, much pubescence. Lenticels conspicuous, numerous, elliptical or round.

Wood buds medium, rather long, reddish chestnut covered with short, grey down. Fruit buds rather small, short, stout, pointed, dark chestnut, pubescent.

Blossoming usually with or little later than 'Cox's Orange Pippin.' *Inflorescence* large, loose, five- to seven-flowered. *Pedicels* long, slender, densely pubescent. *Flower buds* very deep crimson, blunt, irregularly obovate. *Flowers* large, little concave or flat, white, palely veined or flushed purple-pink ; deeper flushing on reverse side. *Sepals* very long, pubescent, much reflexed. *Petals* oval, long, broad ; claw long, stout.

Stamens long, spreading out ; anthers and stigmas usually on level. *Style column* stout, about one-third total length, sparsely downy ; downy at union.

Very fertile ; has cropped remarkably heavily over several years.

THE AWARD OF GARDEN MERIT.—XXII*

By F. J. CHITTENDEN, F.L.S., V.M.H.

158. ILEX AQUIFOLIUM CAMELLIAEFOLIA.

Award of Garden Merit, January 1, 1931.

The holly is the finest of our native evergreens and comes near to being the finest evergreen hardy in the British Isles. Its sturdy appearance, admirable shape, glossy leaves, complacence when pruned, long life, and bright berries, often freely borne, make it worthy of a place not only in any garden but in all gardens.

Like most other plants which have been grown long in gardens, holly has given rise to a multitude of varieties, differing mainly in the size, colouring, and form of their leaves, but also in the colour of their berries, and in the freedom with which they are produced. Some varieties bear staminate flowers only and cannot fruit, some pistillate only, and fruit well when pollen from another variety is available, a few bear hermaphrodite flowers, and do not depend upon the presence of another variety, and these are best for fruit-bearing. Best of all, perhaps, are the trees which carry their fruits for two years as some trees will.

While almost all varieties of holly are worth their place and, provided they are transplanted carefully and cared for until they have established themselves in their new quarters, are likely to succeed in most soils, the variety chosen for the Award of Garden Merit is *camelliaefolia*, remarkable for the size of its fine, dark, burnished, green leaves, up to five inches long and two inches broad. The leaves are often entirely without spines, though they may bear some. This variety bears pistillate flowers, and therefore requires a pollen-producer planted near. When pollen is available it fruits well, and the contrast between the deep green foliage and brilliant scarlet berries is striking and beautiful.

There are other varieties with large leaves, like *altacrerensis*, with rather shorter leaves up to three inches wide, with staminate flowers, and *nobilis* is very like it; *Hodginsii*, with large, roundish, dull green leaves, berry-bearing; *Marnockii*, very near *camelliaefolia* but with broader leaves, somewhat twisted; *Shepherdii*, with bright green leaves about four inches long; and *Wilsonii* with leaves as large as *Marnockii*, but dull green and spiny, also berry-bearing.

* The notes on the first hundred plants to receive the Award of Garden Merit have been collected from our JOURNAL, vols. 47 to 53, and published as a pamphlet, price 1s. For subsequent notes see vol. 54, pp. 218 and 423; 55, pp. 121 and 276; 56, pp. 80 and 245; 57, pp. 65 and 354; and 58, p. 171.

159. *ERANTHIS* × *TUBERGENII*.*Award of Garden Merit, March 13, 1928.*

The Winter Aconite has been grown in the gardens of those who like to have flowers there the year round from very early times, but it was not until 1807 that it acquired the name by which it is now universally known, *Eranthis hyemalis*, when SALISBURY pointed out the characters which separate it from the related Hellebores. It has always been appreciated and it was one of the first plants to be figured in the *Botanical Magazine*. The third article and plate (dated 1786) in that Magazine describe and figure excellently *Helleborus hyemalis* as the plant was then known. It had been introduced from the mountains of Italy and Austria, and has become naturalized here and there in this country. For long it was the only species of its genus grown in gardens, and it was not until 1892 that another was seen here. In that year *E. cilicica* flowered in England, having been collected near Adalia in Asia Minor by Mr. WHITTALL, of Smyrna, and distributed by him. *E. cilicica* differs from *E. hyemalis* mainly in having the green involucre below the flower more finely cut (there being 25 to 40 segments instead of 12 to 20), in having generally broader sepals, and in a few other minor characters. It is the only form of the genus found in the Near East, *E. hyemalis* being wild no further east than Bosnia. BOISSIER records it from the high mountain valleys of the Cilician Taurus.

E. × Tubergenii was raised at Haarlem by Messrs. Hoog by crossing *E. hyemalis* and *E. cilicica*, the resulting plant being more vigorous than either of its parents, multiplying more rapidly, and bearing larger flowers. It was well figured by Mr. BOWLES in the *Gardeners' Chronicle*, vol. 75, p. 131. Mr. BOWLES points out that the green involucre is more reflexed than in *E. hyemalis* and less divided than in *E. cilicica*. At first the plant produced no seed, though stamens and pistil appeared to be perfect, but it is possible that, though we have no direct evidence of it, seeds have since been produced, for plants of *E. × Tubergenii* have come to our notice with a closer leaning towards *E. hyemalis* than those we first saw and that received an Award of Merit in 1924.

E. × Tubergenii is a fine plant for most soils, especially among deciduous shrubs, with bright yellow sweet-scented flowers in February, coming at the same time as most of the forms of the common Snow-drop and equally worthy of a place.

160. *SALIX ALBA VITELLINA PENDULA*.*Award of Garden Merit, March 23, 1931.*

Among the most striking trees at Wisley in spring, summer and winter are two weeping willows—one planted on the bank of the pond in Seven Acres, which came from France about 1918 under the name

of *Salix pendula nova*, the other on the island in the same pond raised from cuttings of the fine tree in Mr. P. D. WILLIAMS' garden at Lanarth a few years later, and received under the name of *Salix babylonica ramuleis aureis*. The two trees are similar in garden effect and of equal value, differing from one another, so far as general appearance goes, only in the shade of yellow-green given to them by the young foliage in March and early April. Both are vigorous, both quite hardy, both make a rounded head, and both have smooth bright yellow branches weeping to the ground and long narrow leaves. Their graceful form and bright green make them desirable trees for summer, and their form and bright yellow stems eminently desirable trees for brightening the winter landscape. They are never anything but beautiful. They will put up with pruning but are best planted where they have room to develop naturally and where they can display their grace without stint. Pruning, when it is necessary, should be done in youth and in such a way that snags are not left nor permanent marks of the pruner's work.

These trees are, no doubt, hybrids, the probable parents being *S. alba vitellina* and *S. babylonica*. *S. alba vitellina* is a native of this country and *S. babylonica* (in spite of its name) of Western China. The earlier hybrid (frequently called *S. babylonica ramuleis aureis*) was introduced by Messrs. Späth of Berlin in 1888 under the name which heads this note.

161. DEUTZIA SCABRA.

Award of Garden Merit, June 7, 1928.

After the first flush of flowers from trees and shrubs which March to late May gives, apart from the later Rhododendrons some thought is necessary in planting the shrub garden for flower from June onwards. The genera Escallonia, Philadelphus and Deutzia are then great helps, and of the Deutzias none is more generally valuable, since none is more hardy and floriferous, than *Deutzia scabra*.

We have, fortunately, gone a good way towards ridding our gardens of the rather dismal dank shrubbery of the Victorian age, with its mass of leggy laurels and its overcrowded weaklings, and can find room for things more suitable and more beautiful. *Deutzia scabra* grows rather too large for the really small garden, since it attains to eight feet or so in height in a few years, and though its branches are almost erect, it may measure nearly as much through. It flowers in late June in erect panicles about $3\frac{1}{2}$ to 4 inches long at the ends of leafy twigs. The flowers are white or pinkish outside and are very freely produced. The summer is not its only season of beauty, for its bare branches are reddish-brown in winter and contrast with the evergreen bushes behind it, or in a mass give a distinctly bright effect in the winter garden. It calls for no special soil and, for pruning, only the removal of the worn-out branches so as to encourage the growth of the strong young ones.

Some confusion has occurred in nurseries and elsewhere with *D. Sieboldiana*, which was called *D. scabra* by SIEBOLD and ZUCCARINI, who introduced it from Japan. *D. Sieboldiana*, like most of the Deutzias, is worth growing, but it is a less desirable shrub than the true *D. scabra*, since it flowers much less freely. *D. Sieboldiana* is a dwarfer shrub than *D. scabra*, has broader, looser panicles of flowers and differs in the form of the staminal filaments, some at least of which lack the toothed shoulders typical of *D. scabra*.

D. scabra is a native of Japan and China, whence it was introduced to this country in 1822. It is figured in the *Botanical Magazine*, t. 3838. It is sometimes offered as *D. crenata*.

162. DEUTZIA \times MAGNIFICA.

Award of Garden Merit, July 5, 1926.

D. scabra, like many other species of Deutzia, is a variable plant and at the hands of hybridists has given many good seedlings differing somewhat from their parents. Among the best of these is *D. \times magnifica*, raised by M. LEMOINE of Nancy in the first decade of the present century, and sent out by him under the name of *D. crenata magnifica*. It was raised by crossing *D. scabra* and *D. Vilmoriniana*.

D. \times magnifica has in its typical form double white flowers in a broader, denser panicle (up to about $2\frac{1}{2}$ inches long) than in *D. scabra*; its foliage is rather greyer than that of *D. scabra*, but in other respects it is like it and is a worthy companion in the garden. It flowers at about the same time, and its flowers, being double, have a rather longer life.

Both *D. scabra* and *D. \times magnifica* are readily struck from cuttings of the half-ripe lateral shoots.

163. ESCALLONIA \times LANGLEYENSIS.

Award of Garden Merit, July 5, 1926.

A little later than the Deutzias just referred to, is *Escallonia \times langleyensis*, a hybrid raised by Messrs. VEITCH of Chelsea in 1893 by crossing the very hardy white-flowered *E. Philippiana* from Valdivia with *E. punctata*. *E. punctata* requires a wall except in the warmer parts of England. *E. Philippiana* has given most of its hardiness and its graceful habit to *E. \times langleyensis*, but *E. \times langleyensis* improved upon it, for its main branches are very long and arching. *E. punctata* has handed on its evergreen habit to some extent to its offspring, and the crimson of its flowers, diluted to a bright rosy carmine, distinct from all other Escallonias. In June and July the sprigs of six flowers or so, each about $\frac{1}{2}$ inch in diameter, are produced at the ends of leafy branches for a great part of the length of the arching shoots.

E. × langleyensis likes a fairly good soil, but is indifferent to lime. It is worth a place on a wall (so long as the wall is not red) in the less mild parts of the country, but in the milder places it will form a very charming shrub in the open border. It is excellent on a rocky bank, placed high where its arching branches may hang down and display themselves.

Though sometimes it is cut in winter it will break up from the base.

The foliage is smooth and glossy, about $\frac{3}{4}$ to 1 inch in length and $\frac{1}{2}$ inch in width, being about intermediate between its parents and contrasting with the yellow-brown bark of the shoots.

164. PRIMULA BULLEYANA.

Award of Garden Merit, July 25, 1932.

The easiest plants to grow, given moist soil, in all the great genus of *Primula* are found among those placed in the section *Candelabra*, the best known of which is *Primula japonica*. *P. Bulleyana* is no exception, and like most of the section it is perennial, and bears its flowers in whorls. It is rather later to flower than *P. japonica* and has orange-yellow flowers tinged red in the bud.

P. Bulleyana grows wild in N.W. Yunnan in moist mountain meadows of the Li-chiang Range at an altitude of 10,000 to 11,000 feet, where FORREST first collected it in flower in June 1906. He succeeded in obtaining seed, which was sent home to Mr. A. K. BULLEY, of Ness, Neston, Cheshire, for whom he was collecting, and after whom he named the plant, and by him distributed to a good many gardens. It soon proved its worth and settled down, sowing itself in suitable places, as on the side of the long ponds at Wisley and to a certain extent in the wood.

Unlike *P. japonica* it crossed readily with some related species, and in several gardens hybrids, especially with *P. Beesiana* and to some extent with *P. pulverulenta*, appeared. These hybrids occurred at Wisley in the wood, and gave a whole range of plants flowering after *P. japonica* was past, of more refined habit, and of orange, pinkish orange, apricot and related shades—a great acquisition for the wild and woodland garden.

P. Bulleyana received a F.C. Certificate when shown on May 18, 1909, and has been figured in our JOURNAL, 35, p. cxxxvi. The only coloured figure is of a flower in *Revue Horticole*, 1916, p. 10.

DUTCH IRISES TRIED AT WISLEY, 1931-1932.

ONE hundred and six stocks representing eighty-one varieties of this comparatively new race of bulbous Irises were received for trial at Wisley in 1930. Six bulbs of each were planted in September and the Committee examined them when in flower on June 5 and 15, 1931, and June 6 and 17, 1932. Flowering commenced at the end of May and continued into the third week of June in the open.

AWARDS, DESCRIPTIONS, AND NOTES.

Flowers White or nearly so.

AWARDS.

Polar Snow, A.M. June 6, 1932. Raised and sent by Messrs. van Tubergen, Haarlem, Holland.

White Excelsior, A.M. June 5, 1931. Sent by Messrs. de Goede, Beverwijk, Holland.

POLAR SNOW (van Tubergen), **A.M.**—21 inches; falls creamy-white, large orange blotch.

MOUNT EREBUS (van Tubergen).—A cleaner white than the last.

WHITE EXCELSIOR (de Goede), **A.M.**—2 feet; standards tinged cream; falls creamy-white, large oblong orange blotch.

C. VAN DE WINDT (de Goede).—1½ feet; falls creamy-white, medium orange streak.

PHILIP DE KONING (van Tubergen).—2 feet; standards dull white, often streaked blue; falls creamy-white, golden-yellow blotch.

A. L. KOSTER (de Goede).—26 inches; standards arching; falls creamy-white, large orange blotch.

Standards White; Falls Pale Yellow.

AWARDS.

van Everdingen, A.M. June 5, 1931. Sent by Messrs. de Goede.

W. de Zwart, A.M. June 5, 1931. Sent by Messrs. de Goede.

LEONARDO DA VINCI (Dobbie, de Goede).—22 inches; falls sulphur.

VAN EVERDINGEN (de Goede), **A.M.**—2 feet; falls primrose, large orange blotch.

DE VOS (van Tubergen).—16 inches; falls pale lemon.

A. V. D. BERG (de Goede).—20 inches; standards silvery-white, arching; falls sulphur.

RACHEL RUYSCH (Dobbie).—22 inches; standards creamy-white; falls cream.

HUCHTENBURG (Barr, de Goede).—28 inches; standards dull creamy-white; falls sulphur.

DU CHATTEL (van Tubergen).—Dwarfer than the last.

VAN DER VINNE (van Tubergen).—Flowers somewhat smaller than 'du Chattel.'

W. DE ZWART (de Goede), **A.M.**—2½ feet; standards creamy-white; falls lemon, large orange blotch.

N. DE MOOY (de Goede).—Dwarfer and with smaller flowers than the last.

JOSSELIN DE JONGH (Dobbie, van Tubergen).—28 inches; standards creamy-white, base yellowish; falls deep yellow.

Standards Bluish-white ; Falls Pale Yellow.**AWARD.**

Apol, A.M. June 15, 1931. Sent by Messrs. de Goede.

CORELLI (Dobbie).—18 inches ; falls lemon, deep yellow blotch.

APOL (de Goede), A.M.—2½ feet ; standards white, base tinged lavender-violet ; falls pale cream, orange blotch. Also sent by Messrs. Barr.

ALBERT CUYP (de Goede).—32 inches ; standards arching ; falls cream, large orange blotch.

HOBBEEMA (de Goede).—2 feet ; falls cream, large deep orange blotch.

DR. HARINGH (de Goede).—28 inches ; standards arching ; falls creamy-white.

VAN SCOREL (van Tubergen).—2 feet ; falls creamy-white, large golden-yellow blotch.

Standards and Falls Yellow.**AWARDS.**

Heemskerk, A.M. June 5, 1931. Sent by Messrs. de Goede.

Albert Neyhuis, A.M. June 15, 1931. Sent by Messrs. de Goede.

Lucas van Leyden, H.C. June 17, 1932. Sent by Messrs. van Tubergen.

Yellow Queen, C. June 17, 1932. Sent by Messrs. de Goede.

VAN DER HELST (de Goede).—2 feet ; standards pale sulphur, arching ; falls lemon.

HEEMSKERK (de Goede), A.M.—2½ feet ; standards pale sulphur ; falls deep lemon. Also sent by Messrs. Barr.

WOUVERMAN (van Tubergen).—Darker than the last.

LUCAS VAN LEYDEN (van Tubergen), H.C.—26 inches ; standards bright yellow ; falls deep golden-yellow.

ANTHONY KOSTER (van Tubergen).—2½ feet ; standards pale cream ; falls deep yellow.

ALBERT NEYHUIS (de Goede), A.M.—22 inches ; standards citron ; falls deep glowing orange.

YELLOW QUEEN (de Goede), C.—34 inches ; standards rich sulphur ; falls buttercup-yellow.

GOLDEN GLORY (Dobbie, Barr, de Goede).—2 feet ; standards deep sulphur ; falls rich orange, middle darker.

Standards Lavender ; Falls Pale Yellow.**AWARD.**

Pieter de Hoog, H.C. June 6, 1932. Sent by Messrs. de Goede.

FRANS HALS (de Goede).—22 inches ; standards pearly-lavender, darker margins ; falls cream.

DAVID TERNIERS (de Goede).—Too much like 'Frans Hals.'

HUGO DE GROOT (de Goede).—22 inches ; standards silvery-lavender ; falls cream.

VAN RAVENSTEYN (Dobbie, Barr, de Goede).—28 inches ; standards very pale lavender ; falls cream.

PIETER DE HOOG (de Goede), H.C.—21 inches ; standards soft pearly-lavender ; falls cream.

FLORIS SCHOLTE (de Goede).—24 inches ; falls cream.

SEEGHERS (de Goede).—31 inches ; standards silvery-lavender ; falls primrose.

VAN BEYEREN (de Goede).—2 feet ; standards pale ; falls sulphur.

Standards Lilac ; Falls Creamy-white.**AWARD.**

Therese Duyll Schwartz, A.M. June 15, 1931. Sent by Messrs. de Goede.

THERESE DUYLL SCHWARTZE (de Goede), A.M.—28 inches ; standards arching, pale silvery-lilac. Also sent by Messrs. Dobbie as 'Therese van Duyll.'

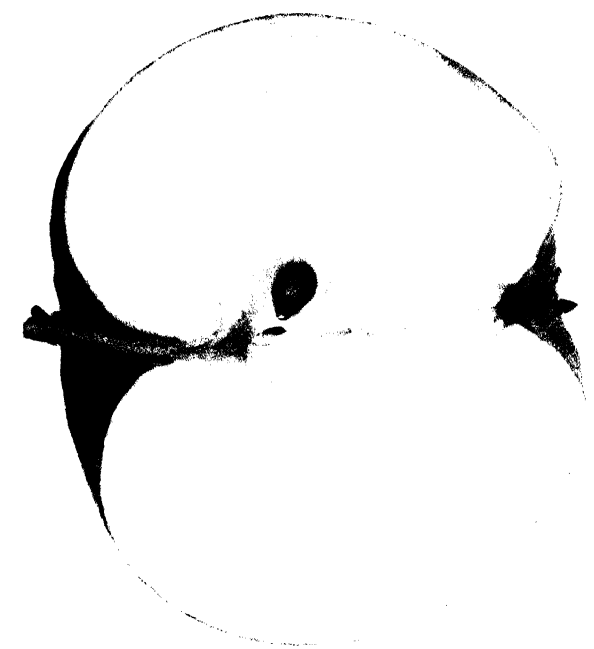


FIG. 145.—APPLE 'A. W. BARNES.'
(p. 398)



Standards Bluish-white ; Falls Cream, tinged Blue.

ANTON MAUVE (de Goede).—22 inches ; standards arching.

Lavender Selfs.

WIELAND (van Tubergen).—2½ feet.

CASTELEYN (van Tubergen).—Larger flowers with paler blotch on falls.

Mauve Selfs.**AWARD.**

Adr. Bakker, A.M. June 5, 1931. Sent by Messrs. de Goede.

ADR. BAKKER (de Goede), **A.M.**—28 inches ; standards pale violet-mauve ; falls paler.

P. CLAESZ (de Goede).—32 inches ; standards pale silvery violet-mauve ; falls dull pale lavender-mauve.

Pale Blue Shades.**AWARDS.**

Wedgwood, A.M. June 5, 1931. Sent by Messrs. de Goede. Award recommended as early variety.

Hart Nibbrig, A.M. June 15, 1931. Sent by Messrs. de Goede.

H. G. POT (de Goede).—20 inches ; standards lavender-blue ; falls bluish-white.

WEDGWOOD (de Goede), **A.M.**—2 feet ; standards saxe-blue ; falls pale sky-blue. Early flowering.

JOSEPH ISRAELS (Dobbie, de Goede).—2 feet ; standards pale lavender-violet ; falls cream tinged lavender.

N. MAES (de Goede).—21 inches ; standards pale lavender-violet ; falls pale azure-blue.

HART NIBBRIG (de Goede), **A.M.**—26 inches ; standards lavender-violet ; falls azure-blue.

DAVID BLESS (de Goede).—Dwarfer than the last, with paler falls.

VAN LOO (Longstaff).—Somewhat darker than the last.

J. DE HEEM (de Goede).—Smaller flowers than the last.

Blue Shades.**AWARDS.**

Imperator, A.M. June 15, 1931. Sent by Messrs. de Goede.

Th. Wyck, C. June 6, 1932. Sent by Messrs. Dobbie, de Goede.

LISSIE ANSINGH (van Tubergen).—26 inches ; standards violet-blue ; falls pale lavender.

VAN DER HEYDEN (van Tubergen).—20 inches ; falls of a darker shade than the last.

TH. WYCK (Dobbie, de Goede), **C.**—2 feet ; standards violet-blue ; falls azure-blue.

CELESTIAL (de Goede).—Similar to the last, but smaller flowers with arching standards.

IMPERATOR (de Goede), **A.M.**—26 inches ; standards arching, medium violet-blue ; falls rich azure-blue.

Dark Blue Shades.**AWARDS.**

Jacob de Wit, A.M. June 15, 1931. Sent by Messrs. de Goede.

Rembrandt, A.M. June 5, 1931. Sent by Messrs. de Goede.

J. Victors, H.C. June 6, 1932. Sent by Messrs. Dobbie, de Goede.

TITAN (de Goede).—32 inches ; standards pale violet ; falls pale azure-blue.

HENDRIK POT (van Tubergen).—14 inches ; standards and falls deeper than the last.

PRAECOX (de Goede).—22 inches ; standards violet ; falls azure-blue.

S. DE ROMBOUT (de Goede, Dobbie).—Very similar to the last, but paler.

FIRST (Longstaff, Dobbie, de Goede).—32 inches ; standards violet ; falls deep lavender-blue.

GARNIER (de Goede).—26 inches ; standards arched, violet ; falls dull lavender.

A. BLOEMAARD (Longstaff, Dobbie, de Goede).—2 feet ; standards rich violet ; falls lavender-blue.

J. VICTORS (Dobbie, de Goede), **H.C.**—20 inches ; standards violet ; falls pale azure-blue.

VAN GOOYEN (de Goede).—2 feet ; standards violet ; falls violet-blue.

JACOB DE WIT (de Goede), **A.M.**—26 inches ; standards arched, violet ; falls rich violet-blue. Also sent by Messrs. Dobbie.

POGGENBEEK (de Goede, Dobbie).—Very similar to the last, but flowers smaller and paler.

REMBRANDT (de Goede), **A.M.**—28 inches ; standards violet ; falls violet-blue, large circular orange blotch.

P. DE MOLEYN (de Goede).—18 inches ; standards deep violet ; falls lavender-blue.

N. KEMP (de Goede).—Taller and with deeper falls than the last.

BLUE CELESTE (de Goede).—26 inches ; standards deep violet ; falls violet-blue.

HOOGSTRATEN (van Tubergen).—22 inches ; standards violet-purple ; falls lavender.

A. SCHEFFER (de Goede).—21 inches ; standards rich deep violet-purple ; falls pale violet-blue.

Standards of Blue Shades ; Falls Smoky Lavender.

GOLTZIUS (van Tubergen).—22 inches ; standards pale lavender ; falls pale.

BASTERT (van Tubergen).—2½ feet ; standards lavender ; falls dull.

THEOPHILE DE BOCK (Barr, de Goede).—Very similar to the last, but flowers smaller and somewhat darker.

DIRK VERBEEK (van Tubergen).—26 inches ; standards lavender-violet ; falls pale.

JACOB MARIS (Dobbie).—18 inches ; standards violet-blue ; falls dull.

PIETER CODDE (van Tubergen).—2 feet ; standards pale violet-purple ; falls pale.

BOOK REVIEWS.

"The Cultivated Conifers." By L. H. Bailey. 8vo. 404 pp. (Macmillan, New York, 1933.) 37s. 6d.

The book is described as successor to "The Cultivated Evergreens" which was published in 1923, and it is indeed an amplification of the portion of that work which dealt with Conifers. Alfred Rehder of the Arnold Arboretum is responsible for the descriptions and keys in the treatment of the Conifer family in this as in the former book. The term "evergreens" is applied more generally in America to Conifers and less commonly to non-deciduous broad-leaved species, the reverse of the custom in this country.

The volume is divided into Books I and II; the former comprises a complete list with descriptions of the Conifers and their varieties cultivated "in the region North of Mexico" and embraces almost all species. Book II deals with the growing of Conifers for ornament and interest, and as it is written more especially for the instruction of Middle-West, Eastern and Canadian readers and from experience gained in the East of the Continent, it is of less value to those in this country where climatic conditions more nearly resemble those of the North-West Pacific Coast.

In Book I the distinguished author has retained the numerous species which recent expert opinion here has merged. All the Spruces and Firs are included which were originally described in "Plantae Wilsonianae," the great record of the plants of Wilson's four Chinese expeditions, edited by Professor Sargent and produced between 1911 and 1917. Since nearly all of these have become known during the last twenty years as cultivated and, some of them, as fruiting plants, writers on Coniferae in this country have reduced substantially the number of species. These views are ignored in the book before us.

The citation of the first authority with the date is given at the end of each description of species or variety; the name of the authority is given unabbreviated—a commendable improvement on the frequent practice. In accord with Professor Sargent *Abies Lowiana* Murray is regarded by the author as a variety of *A. concolor* Lindley and Gordon, despite the distance of the habitat of the one from that of the other. They are also markedly different in their hardiness in Eastern America; the structural differences of the foliage and the distinction easily recognizable in the scent would seem to indicate that they merit separate specific rank. It is heartening to see the good name of *Pseudotsuga Douglasii* reverted to instead of *P. taxifolia* which has been so often adopted. *P. glauca* is described as a variety of the former. Most British cultivators remain assured of its right to be regarded as a distinct species. As the Green Douglas is almost universally attacked in this country by *Chermes cooleyi* while the Blue Douglas is immune, and the latter in turn is liable to destruction by *Rhabdochline Pseudotsugae* which, so far as I am aware, has never been found on Green Douglas even when the two are interplanted, a real specific distinction is surely indicated between these trees. The difference in the scent is recognizable by anyone who possesses that faculty in an elementary degree. *Pinus Jeffreyi* is regarded as a true species; it is generally considered a varietal form of *P. ponderosa*. The Genus *Chamaecyparis* is divided from *Cupressus* to embrace the six Cypressess whose seed ripens the first year. *Taxodium* is regarded as comprising three species; many botanists only recognize one. *Thujaopsis* is given generic rank and not merged in *Thuja* because of its five seeds to each scale.

The taste for horticultural and especially dwarf forms appears to be even greater in the United States than here. The named varieties enumerated of some species are bewilderingly large. Of *Juniperus chinensis* there are described and named 26; of *J. virginiana* 24; of Lawson Cypress 30; of *Thuja occidentalis* 48; and of Norway Spruce 49. In all 332 species and hybrids and 600 varieties appear in Book I. The author in the Preface prefers his own word 'cultivar' rather than 'variety' or 'forma,' though 'var.' is used in the body of the book in accordance with usual practice. The volume is excellently and profusely illustrated with 48 tree photographs and Book I with specimen drawings. The Preface is a good conspectus of the scope of the work, and includes a clear and most enlightening history of terminology leading up to the present rules as laid down by the Cambridge International Congress of 1930. It would be very desirable that all our British nurserymen could take to heart the words with

which the author concludes this matter. He says: "One who raises plants attentively should be as keen to keep abreast the main progress in nomenclature as in new methods of cultivation or of fertilizing or of control of pests." Although the Conifer Conference, organized by the R.H.S. in 1891, established once and for all the families of *Pseudotsuga* and *Tsuga* and split the supposed family of *Retinispora* (or *Retinospora*) into its component parts of *Thuja* and *Cypress*, several of our best-known nurserymen continue, forty-two years later, such misleading entries in their catalogues as *Abies Douglasii*, *Abies Albertiana*, *Retinispora plumosa*, and transpose and mangle *Abies* and *Picea* as if there were no long-ago recognized fundamental differences between the Firs and Spruces. The invariable if unconvincing reply to remonstrance is that buyers would not know what they are offered if the proper botanical names were used! It is thus only British nurserymen who keep alive indefinitely the confusion that exists in the minds of some growers owing to the egregious mistakes of nomenclature in trade catalogues of Conifers. Happily there are many, however, in recent years whose catalogues are irreproachable.

Book II is contributed to by several cultivators and teachers. As mentioned earlier, the information is especially for those who have to contend with the extremes of a climate widely differing from our own.

The new word "conetum" is used more than once as a synonym for pinetum; it does not seem to be an improvement upon it.

W. T. MACCOUN, of Ottawa, makes a contribution on the growing of Conifers in Canada, and what he tells us of the exotic species that are thriving in British Columbia is of interest to British readers. He makes a slip when he says *Cunninghamia* "is closely related to the Pines."

The most interesting matter in Book II is contained in Chapter X, which deals with the insects and fungus diseases that attack Coniferae in America; the writers on the former are C. R. CROSBY and M. D. LEONARD, and on the latter D. S. WELCH. The list is a very different one from what would be made up in this country. The most destructive would appear to be the White-pine rust, *Cronartium ribicola*, which attacks all the five-leaved pines and which, alas, was probably introduced from Europe in 1900. As is well known, the fungus passes its alternate life on *Ribes*. It is melancholy to learn that it is now "rapidly becoming established in the north-west, where it threatens the very valuable stands of *Pinus monticola* and *P. Lambertiana*."

Fellows of the R.H.S. may be fittingly reminded at the close of this review that their Council dedicated to the author, L. H. BAILEY, the 153rd volume (1927) of the venerable Botanical Magazine, the highest compliment they could pay. Thrice before have dedications been made to Americans of great distinction: Volume 76, in 1850, to Dr. JOHN TORREY; Volume 78, in 1851, to Dr. ASA GRAY; and Volume 137, in 1911, to Professor C. S. SARGENT.

Dr. BAILEY's name will always be connected with the three great cyclopedias of American agriculture and horticulture for which he was responsible.

"Monograph and Iconograph of British Orchidaceae." By Colonel M. J. Godfrey. 4to. xix + 259 pp. 57 coloured plates. (Cambridge University Press, 1933.) £7 7s. net.

This elaborate work will be greatly appreciated, for not only is it the first monograph of British Orchids with coloured plates, but the work is based on original observation of living plants, studied year after year in their natural habitats in many localities. It is not a compilation, neither is it confined to diagnoses. The biological as well as the taxonomic side has been taken up, and the author's aim to give a clear conception of the plants as living organisms has been well realized.

Descriptions of Orchids based on herbarium material are frequently unsatisfactory, mainly because the delicate mechanism of the column becomes much distorted or destroyed during the process of desiccation. The present work contains 57 coloured plates prepared from water-colour drawings by the late Mrs. Godfrey, and the accuracy of this artist's work may be judged from the fact that in 1925 the R.H.S. Gold Medal was awarded to her for an exhibit of 186 drawings of European Orchids. The plates represent 50 species, sub-species and varieties, life-size. In many cases enlarged single flowers and in some cases analytical details are given. In addition, there are numerous black-and-white illustrations, among the most interesting of which are Herr Pfeiffer's photographs, for they stand out with stereoscopic clearness and perspective when examined with a specially made "viewer."

This Monograph is arranged to indicate the trend of evolution from the more simple and ancient types to comparatively recent and more specialized forms.

The genus *Ophrys* is therefore dealt with in the concluding pages of the book, for it appears to show the highest degree of specialization yet attained in the evolution of terrestrial Orchids.

Following the Introduction, which is mainly for non-botanical readers, there is an interesting chapter on the evolution of the Orchid flower. The next chapter deals with the evolution of genera and species, the author's opinion being that no new genera seem to be in the making, evolution, as far as European terrestrial Orchids are concerned, being apparently now confined to the expansion of existing genera. Much information is given in the chapter on Pollination, as also in that dealing with the life of an Orchid. Other chapters are devoted to Hybridism and to Nomenclature.

The Description of Genera and Species, as may be expected, occupies the main portion of this monumental work. There is a Conspectus of groups of British species, and a popular Key to British sub-families and genera. Habitat, distribution and fertilization are adequately dealt with, and many of the coloured plates contain a figure of the particular insect that transports the pollen. A table showing the number of species in each genus in Britain indicates that *Orchis* heads the list with 12, followed by *Epipactis* with 6. Members of 19 other genera bring the total number of species to 47. The final pages include a Glossary, mainly for non-botanists.

This Monograph and Iconograph, produced by one of our greatest authorities on British Orchidaceae, far exceeds in size, contents and original matter anything that has hitherto been published on the subject. It will be universally regarded as the most authoritative work on this beautiful family of the English Flora.

"The Story of the Garden." By Eleanour Sinclair Rohde. (Medici Press, London, 1932.) 16s. net.

The promise of a new book by Miss Rohde upon garden history naturally stimulates our expectation, and as it is produced by the Medici Press we are assured of a comely book, well illustrated and printed.

The present work falls short in no way of our hopes, save that its title is a little misleading. It should surely have been "The Story of the English Garden." The first sixty pages deal with gardens outside England, but the bulk of the work, from p. 61 to p. 239, is devoted to the English garden, as the chapter headings indicate: "The Tudor Age," "Stuart Times," etc. The last twenty-nine pages, devoted to American gardens, are from the pen of Mrs. Francis King. The whole work, therefore, must be compared to the "History of Gardening in England" by Miss Alicia Amherst, and for a wider historical survey we must turn to Miss Gothein's "History of Garden Art," reflecting, meanwhile, upon the curious fact that the garden history of Italy and France yet remains to be written.

The Medieval garden is dealt with very fully by Miss Rohde, and it is easy to see that this period has a special appeal to her. The transition, however, to the English Tudor Age is a little abrupt, and we shall not find in this work any detailed treatment of Moorish, Italian and French gardening, nor that of Greece or Rome. Miss Rohde's reading has evidently been mainly in English horticultural literature, and for this reason we regret the omission of this word in the title.

The author is strongly influenced by the idea that the form of European gardens was largely determined by the Eastern need for irrigation and that all square beds or chessboard plans are due to this. "Every illustration," we read, "of a Medieval, Tudor or Stuart garden, every book in the whole range of Medieval, sixteenth and seventeenth century garden literature, whether English, French, Italian or Dutch, points to the influence of garden craft based on the necessity for continued irrigation."

A very favourite Medieval garden, however, was the wattle enclosure with a flowery mead enclosed; there also may be seen in Gozzoli's "Procession of the Magi" (1457) an exact picture of what was later called an "English Garden," winding paths among trees, with grass plots and irregular beds, no trace of the square beds at all.

The "Mary" garden, illustrated by Miss Rohde herself, plate 11, shows the usual suburban arrangement, a border round the boundary.

On page 3 Miss Rohde writes: "It is not natural to lay out beds in squares, but in the East this was necessary to facilitate the continual irrigation needed." The square or rectangular bed may not be natural but it is practical. The herbalist used it presumably to give easy access to his plants, just as one of our greatest apostles of "Natural" gardening uses it to display his flowers upon a terrace. No one would deny an Eastern influence in European garden design, but we think that practical convenience must be allowed a greater weight.

From Tudor days onward Miss Rohde takes us frequently through the history

of horticulture in this country, telling us of its gardens, majestic and homely, and of the travellers who brought from foreign lands the many flowers and trees which we now accept as our heritage.

The reviewer cannot resist a protest, however, on reading once more that "Sir Walter Raleigh and Thomas Herriot brought the Potato back from the New World in 1585 or 1586." In the first place Herriot travelled alone to Virginia, and Sir Walter did not reach the New World until 1594; his courtly functions and his many sinecures kept him at Gloriana's side until that date. The critic, however, must not unduly press his variant views when there is so much that is agreed upon, and the general reader will find a detailed history of the progress of the English garden skilfully presented.

From the gallant Elizabethan days new plants came in from many foreign lands, and as usual we learned much from our former enemies.

The logical French mind gave us those majestic formal gardens, "riding gardens" as they have been called. "Walking gardens" came from the Low Countries and with them an appreciation of flowers for themselves rather than as decorations, both forms of garden revealing the national taste: nobility and splendour on the one hand, a democratic cosiness on the other, the garden of Racine and the garden of Cowper. It is good to learn that this English tradition is now flourishing across the Atlantic and gardening, beginning as a fashionable cult, is now spreading to all classes. It may well be that in this homely craft the best antidote to the machine age will be found.

The Bibliography which terminates this work consists of 34 pages and is arranged chronologically. In comparison with that of Miss Amherst it contains about the same number of entries but fewer notes, and omits the sizes of the books quoted, 8vo, 4to, etc.

In a hasty survey we note a few books which are omitted, as, for instance, the extremely rare, if not unique, "Craft of Grafting and Planting" of William Copeland, 1565, which fetched a fabulous price at the Britwell Sale. Missing, too, is the "Complete English Gardener" of Samuel Cook, 1769, which also escaped the eye of Miss Amherst.

Under the entry 1640 "The Expert Gardener" is given, and it is said that the only known copy is in the Library of St. David's College, Lampeter. There is, however, a copy in the British Museum.

We should have been grateful for a list of garden books to date, but the author elects, as did Miss Amherst, the year 1838 as a terminus of bibliographical endeavour. A full index of twenty pages completes the work.

A word must be said for the excellent illustrations, some of which will be new to most readers, the colour reproductions being such as we expect from the Medici Press.

Miss Rohde has written an eminently readable book and one which skilfully unfolds the rich and varied history of the English garden.

"The Art of Flower Arrangement in Japan." By A. L. Sadler. 8vo. (Country Life, London, 1933.) 12s. 6d.

As floral decoration has been made the subject of intensive study with the Japanese for many centuries, it is only to be expected that this art has reached a much higher standard of aesthetic taste in their country than in any part of the Western world. For this reason one cannot help feeling that Professor Sadler has been unduly disparaging of the efforts of his own people. It is freely admitted that flower arrangement in most European and American homes is usually carried out without thought or care, and that it is often entirely devoid of any artistic restraint, but at the same time it is hardly fair to write of our methods as "the barbaric massing of colours," or to speak of them as "the multicoloured cauliflower bouquets of the West." In most cases such condemnation is no doubt well deserved; but there are many exceptions. It must be remembered that Art is not altogether instinctive. It is a cultivated refinement of civilization, and many of us who have taken the trouble to acquire these qualities are quite capable of arranging flowers with good taste and in perfect keeping with the decorations of our Western homes. The results may not always conform with the canons of Japanese artists (who are often content to glean their material from the simplest herbs), but this is only to be expected, for with us we attach far more importance to colour than design, whereas the reverse is the case in Japan.

Although the author of this book does not profess to give instruction in the Japanese methods of flower arrangement, much can be learnt from a careful study of the numerous figures that illustrate the different styles adopted by the various schools. The keynote of all seems to be simplicity. Colour sense is not

unusual in Western homes, but reticence in composition seems to be rare. If, then, this lesson can be learnt from the Japanese we will owe them a deep debt of gratitude. It is well known that our pictorial art has been greatly influenced by the simple, asymmetrical, compositions of this Eastern race. Let us also, in this humbler art, benefit by their centuries of study!

It is not likely that floral decoration will ever receive the serious attention in the West that has been lavished upon it in Japan. According to tradition the school of Ikenobo was founded in A.D. 607, and from that date, down the centuries to the present day, it has been regarded as a cult worthy of the thought of learned men. It is hardly surprising, therefore, to find that the art has now reached a very high degree of perfection, and although it is perhaps now being contaminated by Western influence, it still remains a peculiar and beautiful manifestation of an ancient Oriental civilization.

"The Mechanism of Creative Evolution." By C. C. Hurst. 8vo. xxi + 365 pp. 199 figures. (Cambridge University Press, 1932.) £1 1s. net.

"Recent Advances in Cytology." By C. D. Darlington. 8vo. xviii + 559 pp. (J. & A. Churchill, London, 1932.) 18s.

"Recent Advances in Plant Genetics." By F. W. Sansome and J. Philp. viii + 414 pp. (J. & A. Churchill, 1932.) 15s.

"Recent Advances in Agricultural Plant Breeding." By H. Hunter and H. M. Leake. 8vo. 361 pp. (J. & A. Churchill, London, 1932.) 15s.

Since Darwin's time the "origin of species" has proved to be a most fascinating topic of discussion and even of heated argument indulged in by professional botanists and the general public alike. The re-discovery of Mendel's work at the opening of the twentieth century gave new impetus to plant breeders and hybridizers and rationalized previous information. Under Bateson's stimulating leadership the rapid accumulation of genetical facts soon showed that the early postulates concerning the hereditary factors and mutations required modification. The brilliant work of Morgan and his co-workers with *Drosophila* (fruit fly) astounded the biological world. Building upon the available cytological evidence which had demonstrated the chromosome mechanism of nuclear division in general outline and had shown that the chromosomes preserve their individuality from generation to generation, and studying the inter-relationship of the hereditary factors, Morgan was able to offer us the chromosome theory—each group of characters of the adult carried by each chromosome and genes, as the physical entities carrying the factors were designated, arranged in linear series. For a while British hybridizers refrained from a complete acceptance of all the implications of this work; but Professor Punnett, working with the Sweet Pea, has also shown that the number of groups of characters linked together corresponds with the number of chromosomes in the gamete and so substantiated the zoological work.

We thus see that the progress of Genetics, the science of breeding, has become permanently allied with the study of the cell nucleus, or cytology.

During the last twelve years innumerable observations have been made of the chromosomes in many animals and plants. It was soon apparent from work on Willows and Roses that species and genera known to the systematist and to horticulturists as close relations, also contained evidence of consanguinity in their chromosome numbers—a simple numerical relationship being frequently observed, with a small basic number as a prominent feature of the genus or family. In cultivated varieties, of fruit particularly, it was observed that the chromosome numbers were closely related to functional activity in questions of seed formation, and in many other respects.

From time to time remarkable forms of cultivated plants have arisen in our gardens; for example, we have early records of *Campanula persicifolia*, and its form *maxima*, now known as 'Telham Beauty.' The cytologist tells us that this "giant" form owes its characters to the fact that its chromosomes are double the usual number of the vegetative cells of the species, that it is a tetraploid possessing four times the usual gametic number. Other "gigas" forms such as those in *Oenothera* we well know.

Occasionally a sterile cross made between species of different chromosome complement may become fertile by chromosome doubling in the hybrid. The classic case occurred in the genus *Primula*, where a fertile plant was so obtained. The plant of *P. floribunda* × *P. verticillata*, proved to be fertile, was shown by cytologists to have doubled its complement of chromosomes so that a pair of each kind of chromosome existed. The importance of these considerations

to horticulture has been pointed out in this and other journals, and is now fairly well recognized.

The books under review contain a summary of evidence upon which recent theories have been built and mark an epoch of diligent experimental work. They also serve as hopeful heralds of an age in horticulture in which deliberate constructive plant breeding, to meet modern requirements, will replace haphazard hybridizing and random selection.

Dr. Hurst's book covers a wider field than the others, his range and his vision are unbounded by the mere confined conventional classifications, but the book is particularly rich in botanical and horticultural references. At the outset he accepts the genetical species as a workable unit, rather than the "good" taxonomic species or the Linnean species.

The first mechanism of evolution to which the attention is directed is the crossing over of the threads of the chromosomes with the resultant exchanged material forming new linkage groups of characters. This cytological evidence is based upon the work of Darlington (and other workers), so that we are soon introduced to the subject-matter of the second volume.

Further light has been thrown on the question of sterility and incompatibility of varieties and species, for even in similar chromosome complexes the arrangement of the genes—the physical bearers of the hereditary units—may be different; or apparently similar chromosomes may bear different genes. It is believed by many that not only do homologous chromosomes pair but that corresponding genes of these chromosomes become closely associated in certain phases of nuclear division. Incompatibility may arise when chromosomes are so arranged that each gene cannot meet its mate.

Despite the importance of chromosome numbers in determining species the work of McClung receives due attention. He examined nearly a thousand species in about a hundred genera of grasshoppers and related insects and found a constant chromosome number.

Hurst considers translocations of the genes in the chromosomes of prime importance as a factor in evolution, and as a cause of the complexity of the organism, he states that translocations played a great part in the general progress from lower to higher organisms.

Polyploidy, the multiplication of the entire set of chromosomes, is also dealt with in a clear manner. Most of the evidence is collected from horticulture. The author successfully attempts an arbitrary differentiation between polyploid varieties and polyploid species.

Another great factor in the evolution of species has been the frequent occurrence of hybridizations and crossings. Karpetschenko's work on the Cruciferae receives adequate attention. It will be remembered that in this family a new genus arose from a cross between *Raphanus* (radish) and *Brassica* (cabbage) and a subsequent duplication of the chromosome complement in the resulting hybrid. The author's courageous attack on the somewhat chaotic state of the systematics of the genus *Rosa* is well known; here he demonstrates the inter-relationship of the so-called species and has also investigated a curious case of apomixis—development from the parent without true fertilization.

Turning to mutations, Müller's work on the influence of X-rays upon the chromosomes and their behaviour comes under review. Thus an experimental technique is available whereby creative evolution can be accelerated; for in the course of a few years mutations that may only occur in long ages in nature can be experimentally produced. Here lies hope for future rapid progress.

Other chapters deal with the possible origin of life or with what little is known of the genes themselves, their size and other characteristics. They are highly speculative but equally stimulating.

The whole is written in dignified English and is free from jargon. The text is profusely illustrated; some of the illustrations are unusually large, but all are remarkably well annotated and have satisfactory legends. Here and there small repetitions occur; but as the subject-matter is discussed from various angles such cannot be avoided. The text, as we have come to expect from the Cambridge University Press, is devoid of errors.

The book is a remarkable and popular tribute to the work of the Geneticist and Cytologist of this century and should be read by all interested in plants. No further recommendation is required to the gardener—to the general public also we recommend the book as one capable of showing the power placed by the scientist in the hands of mankind.

Turning now to the cytological aspect, Dr. Darlington's work is already well known to all gardeners by his illuminating articles in the *Gardeners' Chronicle*, where he has shown us the bearing of cytology on plant breeding. The present work is a review of the recent progress made in cytology, and it is a

complete one too, as far as nuclear observations are concerned. As Professor Haldane remarks in the introduction, the chapter of outstanding importance is Darlington's last one, in which he discusses the sources of variations and the true nature of species: a provocative and serious contribution.

The book is one for the advanced student; the careful way in which the author deals with the evidence from many other investigators upholds a high standard of criticism and enhances the value of the work. The book as a whole has unity of purpose and it may well be termed "*the book of the chromosome*," for all facets of the study of the morphological structure of chromosomes receive due attention.

The whole text, although closely reasoned, is certainly readable; moreover the appendix of bibliography is not the least valuable part of a highly important book. For the general reader, the glossary of technical terms is a welcome feature. The illustrative plates are good and well chosen.

A summary of plant genetical work of the last decade of outstanding importance is attempted by Dr. Sansome and Mr. Philp. This book is also primarily designed for the senior student. The authors state in their preface that they have "subordinated particular aspects to the wide view." Their view is not, however, nearly wide enough; for frequently the reader will find himself lost in the details of experimental evidence and "unable to see the wood for the trees." They too conclude with a general chapter dealing with species. Their text-book is primarily concerned with the cytological aspects of genetics, and from Chapter II onwards chromosomes feature in the title and text of every chapter. There are surely other aspects of plant genetics worthy of review, and it is left to Hunter and Leake to show them to us in their book on Agricultural Plant Breeding. This task they accomplish in no uncertain manner; they burst "from the limits of academic interest" (referred to in their preface) in full vigour.

Their work deals with the practical improvements already made in many agricultural crops. One wishes that the same kind of story had been written on horticultural plants, but the authors dealing with these missed the golden opportunity.

In Hunter and Leake's book crops of both tropical and temperate regions are dealt with in an authoritative manner.

The attempts made to obtain varieties resistant to attacks of fungi and insects illustrate one aspect of the breeder's problems, but always yield and quality are the chief objects in view. Morphological characters are often more easily discernible than certain physiological ones; yet with the grasses, for example, both selection and hybridizing are employed to produce highly nutritious strains as judged by chemical composition of the tissues.

Again with rubber, where an important factor of the yield is undoubtedly inherent, progress is now being made by eliminating poor yielding trees. A search for characters related to yield reveals the possibility of a correlation of yield with the diameter of the latex tubes; vegetative propagation is fast replacing seed sowing as a means of multiplying high-yielding trees.

Space forbids mention of other interesting chapters dealing with developing industries, e.g. sisal hemp, and with jute, and the products of the coconut. We may soon perhaps see hardy varieties of soy bean in our own fields and gardens. The work on Brassicas will not be overlooked by gardeners.

This excellent review deals with practical problems in a clear, concise, and stimulating manner, and the illustrations and references are all satisfactory.

We are indebted to all the authors for the way in which they have carried out their work; and to the publishers for their enterprise in bringing to the notice of the public the accomplishment of plant breeders, geneticists and cytologists.

Certainly these aspects of the botanical and agricultural research during the first quarter of the century, since Mendel's work became known, have been well reviewed and this period has undoubtedly proved rich in practical results. We have yet more to hope for, as the result of further genetical work. These four books fittingly record this biological activity.

"Plant Sociology: the Study of Plant Communities." By Dr. J. Braun-Blanquet. Translated by G. D. Fuller and H. S. Conard. 8vo. xviii + 439 pp. (McGraw-Hill, London, 1932.) 27s. net.

The translators have not only Anglicized but also revised and edited the original German work, which appeared as "*Pflanzensoziologie*" in 1927.

The German edition is well known and this quite adequate translation will

enlarge its usefulness as a statement of our knowledge of the vegetation of the earth.

Some of its matter will naturally arouse criticism and meet with opposition, for a complete statement of the relationships of plants to one another and the world about them is not yet possible. Probably this criticism will start at the opening paragraph, where the nature of the dependence of one plant upon another is discussed.

For the rest it will suffice to say that the whole matter of plant ecology and its implications is dealt with in a masterly fashion, and the vast accumulation of material which has been made, as the Bibliography shows, almost entirely during the past thirty years, has been digested and summarized so as to provide a text-book which all advanced students of Botany will need.

"Violet Culture for Pleasure and Profit." By F. E. Dillistone. Ed. 2. 8vo. 62 pp. (Benn, London, 1933.) 2s. 6d. net.

This excellent little book, first published in 1926, has been reprinted with a few alterations and the addition of short chapters on "New Varieties," "Varieties for Winter and Spring Growing," "Further Cultural Details," "Recent Advances in the Treatment of Diseases and Pests," "Import Duties," and "History and Literature of the Violet."

"Life in the Plant World." By F. H. Shoosmith. 8vo. 312 pp. (Harrap, London, 1932.) 5s. net.

This is an attempt to give in popular language an account of the various plants that are or have been found in the world. It is an interesting story, on the whole well told, but here and there, perhaps in the effort to use a telling phrase, some looseness of thought is evident, and occasionally misquotation. To the latter we are introduced in the first page, where the animal is said to be free to seek "fresh fields."

These lapses are not common, however, and on the contrary many popular fallacies are dealt with in a kindly and reasonable fashion, so that regarded as what it is intended to be, a popular account of plant life, it is a book to be recommended.

"The Fragrant Path. A Book about Sweet-scented Flowers and Leaves." By Louise Beebe Wilder. 8vo. (Macmillan, New York, 1932.) 15s. net.

A wholly delightful book, both for the writer's pleasantly friendly, even chatty, sentences and the wealth of quotations from others, ranging from Gerard to Mary Webb and Dr. Hampton. They are so wisely classified and so aptly fitted in that you wonder however one lady could find so much time to read and mark so widely, and thereby save other folk from a similar expenditure. To quote adequately from this rich store would entail writer's cramp for the reviewer and a reprimand from the Publications Committee, but a recapitulation of chapter headings will illustrate the wide field that is covered: I. Pleasures of the Nose. II. Earliest Scents. IV. Gilliflowers. VIII. Summer and Autumn Scents. XI. Night-scented Flowers. XVIII. Plants of Evil Odour. Many chapters close with alphabetical lists of plants that answer to the group classified therein. This practice adds greatly to the value of the book and provides a wealth of information in the most easily accessible form. "Wild Scents" is a chapter with a list requiring no fewer than 46 pages. Therein we are told that *Convolvulus arvensis* possesses a redeeming virtue in a scent like that of Heliotrope. *Paeonia Brownii* is sweetly scented, but the leaves smell like Skunk-cabbage when bruised. The bark of *Ulmus fulva* has the odour of Fenugreek; and *Wyethia mollis* has a strong odour—oh, that this vanished beauty might once more scent English gardens!

It seems strange that the faint scent of *Campanula lactiflora* is noticed though the strong, almost too heavy, balsamic odour of *C. pyramidalis* has been omitted. It is only the pollen-bearing form of *Ailanthus glandulosa* that loads the air with an evil odour; the pistillate plants suggest a distant bean-field—very pleasantly.

Hippocrepis comosa is perennial in Britain—not, as stated, annual or biennial; and the seeds of *Iris foetidissima*, not the pods, are scarlet. Climbing Buckwheat should be *Polygonum Convulvulus*, not *P. Persicaria*. Misprints and errors are, however, few and far between in this readable and fascinating book.

"Simple Rose Growing." By A. G. L. Hellyer. 8vo. 130 pp. (Collingridge, London [1932].) 2s. 6d. net.

One of the "Amateur Gardening Simple Handbooks" which certainly ought to be popular since it is clearly written, takes the sane standpoint that too much importance should not be attached to having the traditional conditions before one embarks upon rose-growing, and gives good sound advice. It is a very useful little book for the beginner.

"Transactions of the Bose Research Institute, Calcutta," vol. vii. Ed. by Sir J. C. Bose. 8vo. 343 pp. (Longmans, Green, London, 1933.) 25s. net.

A variety of subjects is dealt with in the present volume, which includes experimental researches into the behaviour of both plants and animals and also certain reactions between the two. An interesting account of the effects of certain fish-"poisons," such as extracts of the stem and bark of *Bassia butyracea*, *Crotalaria paniculata*, *Derris elliptica*, *Fluggea Leucopyrus*, *Lasiosiphon eriocephalus*, *Millettia piscidia*, *Mundulea suberosa* and *Berberis aristata*, of seeds and fruits of *Anamirta Cocculus*, *Barringtonia racemosa*, *Diospyros montana*, *Gynocardia odorata*, *Hydrocarpus venerata*, *Randia dumetorum*, *Sapium indicum* and *Spilanthes Acmella*, and the root of *Millettia pachycarpa*, by the Director of the Institute is given at the beginning of the book. The particular poison used was from the last, and the conclusion is reached that this extract causes paralysis and consequent asphyxiation, not general poisoning. The fish are used for human food without harmful effects.

Various experiments upon *Mimosa* and its mechanism for response to various stimuli, and upon *Neptunia oleracea*, the action of different rays of light on plant growth, the proteolytic enzymes of *Carica Papaya*, the chemical examination of oils from various Leguminous plants, and other matters of less interest to those concerned with plants are all reported upon.

"Hardy Flower Gardening in Scotland and Northern England." By M. E. Stebbing. 8vo. xii + 259 pp. (Grant & Murray, Edinburgh, 1931.) 8s. 6d. net.

Gardening in its essentials is the same in northern as in southern England, and on the whole hardy herbaceous perennials "do" better in the northern gardens in autumn than they do in southern. There is a greater difference between the east and the west of these islands in the details of practice and in the kinds of plants that may be expected to thrive than between the north and south, with this exception, that autumn fruits as a rule fail to mature so well in the north.

Having said so much we must look into detail and see whether plants peculiarly fitted for northern gardens are adequately dealt with—*Meconopsis* species, for instance, and *Nomocharis*, and we find neither mentioned. This is a serious omission, and we might point to many others. Selections of varieties, too, often omit really good things for the purpose discussed. If one wants a tulip, for instance, to grow and flower in one place for many years there is none more complacent than 'Couleur Cardinal,' which is not mentioned. And so one might go on, and might also draw attention to the many mistakes in plant names scattered through the book.

To emphasize these too much would be to give a wrong impression of much that the book contains, for there is a great deal of good advice in it, and wise counsel, and for that this book is of value, though its price is rather high.

"The Use of Fertilizers in Tropical and Sub-Tropical Agriculture." By A. Jacob and V. Coyle. 8vo. 272 pp. (Benn, London, 1931.) 10s. 6d. net.

Numerous results of experiments are given and the conclusion reached that artificial manuring may reduce the costs of production of tropical crops materially, but ill-considered use of badly balanced "complete fertilizers" can only result in unnecessary expenditure, if not actual loss. The crops dealt with are, of course, not of great interest in the garden.

"Principles of Soil Microbiology." By S. A. Waksman. Ed. 2. 8vo. xxviii + 894 pp. Plates. (Baillière, Tindall & Cox, 1931.) 52s. 6d. net.

The first edition of this text-book, indispensable to the serious student of the problems presented by the soil, appeared in 1926 and now after a very short period a second edition has been called for. The opportunity has been taken

to bring up to date all parts needing it and the chapters on mycorrhiza, on plant and animal parasites in the soil, on the decomposition of green and stable manures, and on the formation and decomposition of peat and forest soils have been greatly revised. These revisions help to keep the book in the forefront of those dealing with its special subject.

"Gardens of Fragrance." By T. G. W. Henslow. 8vo. xvi + 244 pp. (Warne, London [1932].) 10s. 6d.

It is difficult to review this volume, for its contents seem to dance from one advertiser's wares to another whether they be vendors of fragrant plants or of garden labels, garden edgings, pot crocks or water gardens. The words "Gardens of Fragrance" recur at intervals.

"Simple Guide to Rock Gardening." By Sir James Cotter. 8vo. 126 pp. (Sheldon Press, London, 1932.) 3s. 6d. net.

This book first appeared in 1926 and now comes as a new edition with the several mistakes it formerly contained corrected by Mr. W. Irving, late of the Royal Botanic Gardens, Kew.

"The New Illustrated Gardening Dictionary." By R. Sudell. 8vo. 1,152 pp. (Odhams, London [1932].) 21s. net.

An alphabetically arranged dictionary with articles by specialists as well as by the author named. The book is too long to review adequately, but one would like to see more uniform treatment of its subjects and a little closer correlation with accepted spelling of plant names. The inclusion of legends and notes on Pigeons of the type found on p. 674 and the like do not add to the value of a Gardening Dictionary.

"Flora of Syria, Palestine and Sinai." By G. E. Post. Ed. 2. By J. E. Dinsmore. vol. 1. 8vo. xxxiv + 639 pp. (Oxford University Press, London, 1932.) 42s. net.

Until recently we have had to depend for a comprehensive knowledge of the flora of Syria upon the excellent Flora written by the Rev. George E. Post of Beirut and published in a rather small edition in 1896. This indispensable work has long been out of print and a great deal of investigation has been carried out since it appeared.

Recently much interest has been taken in the flora of the region and the latest book is the one now noticed, the first volume of which, printed at the American Press, Beirut, has just appeared.

The flora is a large one, 4,200 species being represented in the area and the nomenclature has been brought up to date.

Following a bibliography, glossary, and list of geographical names come keys to the families and lists of species and varieties with brief diagnoses of all plants occurring wild or commonly grown. The common English and Arabic names (transliterated) of the plants are given (and occasionally the Hebrew names), references to literature, time of flowering, habitat and localities.

Many species are illustrated by line drawings showing important diagnostic characters, the paper used is thin so that the bulk of the book is less than the number of pages might suggest, the type is clear and the printing on the whole well done. It is a pity, however, that it has been found necessary to include ten pages of additions and corrections, and this might easily have been lengthened. With a little different management these corrections might have been put in their proper places in the text.

The Flora is to appear in two volumes of which this, the first, includes the families from Ranunculaceae to Dipsacaceae, which in the first edition took up 370 pages and now occupy 619 of rather larger size.

This extra space is needed partly to accommodate an enlarged synonymy, partly for lengthened descriptions especially of cultivated species, partly for new species added to the flora since the first edition, and partly by the use of larger (though scarcely clearer) type.

The number of new species does not appear to be very great and is due in part to the elevation of subspecies or varieties to the rank of species and to the inclusion of cultivated plants like the custard apples.

The area holds so many monocotyledonous plants of great interest to horticulturists that we shall look forward to seeing the second volume of the

revision soon, hoping that a little greater care may be exercised upon the proof sheets (for a publication emanating from a University should be a pattern in this direction), and the relegation of such notes as under *Hypecoum dueleroparviflorum*, where the pod is described as "often with tumid joints, where stung by insects," to the end instead of including them in the technical description. Specific characters of plants ought not to be founded upon casual injuries brought about by external agents.

"A Book about Roses." By Dean Hole. Ed. by E. F. Daglish. 8vo. xix + 276 pp. (Dent, London, 1932.) 3s. 6d. net.

Dean Hole wrote this book in 1869 and several editions have been published. The present one constitutes one volume of "The Open-air Library," and it is a reprint of Dean Hole's last edition of 1901 with Dr. A. H. Williams' chapter of 1911 on "Progress" and his list of Roses, and an additional list now contributed by the Editor, intended to bring the list of varieties up to date. The Editor also writes an introduction.

Though the book (except for the additions mentioned) is thirty years old, and older still in its main parts, it is one that no rose-grower or rose-lover should miss, and if there be any who love good books yet have no love for roses, still they should not miss reading this book. For it belongs to that small class of books on garden matters that are also literature. It is a book fragrant of those old gardens to which the scent of an old-fashioned rose takes back our minds as surely as we meet it: of leisured hours and leisurely ways: of times to enjoy the good gifts of the earth without letting the stress of outer affairs divert our minds: of times good to go back to now and then. And it is a book from which we may still learn much concerning the way to grow roses well.

Needless to say it is clearly printed on well-chosen paper—the publisher's name is enough to ensure that.

"Commercial Bulb Growing: Bulbs and Blooms for Market." Anonymous. 8vo. 75 pp. (Nurseryman & Seedsman, London [1932].) 7s. 6d.

The twenty-four chapters of this useful book contain instructions and warnings concerning the commercial cultivation of Narcissi (occupying half the book), Tulips, Hyacinths, bulbous Irises, Freesias, and Gladioli. The instructions appear to have been carefully considered and are clearly set out in good type. No doubt some of the instructions will not represent the practice of all successful growers—that is only to be expected, for conditions vary greatly and with varying conditions varying methods must be used; nor have we yet reached finality in regard to methods. In many things we are only at the beginning of knowledge, but here is at any rate a good foundation and the author gives many timely cautions to the beginner.

"From Cedar to Hyssop: A Study in the Folklore of Plants in Palestine." By Grace M. Crowfoot and Louise Baldensperger. 8vo. viii + 196 pp. (Sheldon Press, London, 1932.) 6s. net.

Miss Baldensperger has lived in Palestine for many years, and her friendly relations with the natives have given her opportunities of garnering knowledge of the ideas concerning the native plants and the uses to which the plants are put which a passing visitor cannot have and which he might interpret in a wrong way. Her knowledge has been collected into this book, and the result is a valuable contribution to the folklore of plants and incidentally a valuable commentary on some of the old herbals, for ancient usage has often survived in Palestine.

"Delphiniums: their History and Cultivation." By G. A. Phillips. 8vo. 256 pp. (Butterworth, London, 1933.) 10s. 6d. net.

This is an excellent account of Delphiniums, dealing with all phases of its subject, tracing the development of the present-day Delphinium and detailing the best practice for the cultivation of the plant for garden decoration and for exhibition. The lists and descriptions of varieties will be found very useful and the special attention drawn to the Belladonna types is timely, though we think to call them pygmies is scarcely accurate, and it is scarcely right perhaps to say that Capri is too tall—though the author evidently has dwarfness in this group as an ideal. The white varieties raised in America are described as being very vigorous, but so far as tested here, their vigour seems to be one of locality, not general.

"Planning and Planting the Home Garden." By Pauline Murray. 8vo. xv + 448 pp. (Orange Judd, New York, 1932.) \$3.50.

The aim of the author has been to show plans of gardens suitable in the main for small or medium-sized houses and to suggest plants that can be easily procured, so that people of moderate means will be able to follow the suggestions made. On the whole, the aim is realized, though here and there one would have difficulty in following some of the suggestions—as, for instance, where (p. 337) the garden-owner is told that "Daylilies (*Hemerocallis*) grow along the roadsides and may be collected in September"—that, be it remembered, in America; or might dislike some of the forms suggested—as, for instance, the arch pictured opposite p. 335; or may find it difficult to follow the argument on such a page as opposite 318, where a formal garden is pictured and the legend "The beauty of formal gardens depends on appropriate setting in which placed, the skill of the designer and the care of the plants to maintain the lines according to the plans." The picture shows a formal garden set apparently in the midst of a wood.

Much good advice is given, as when we are told to avoid the making of unnecessary paths and to employ material suitable to the locality to use for their surfacing. The illustrations are well reproduced, the plans clear, and the printing good. Even though the book is intended for American readers, the garden-maker on this side of the Atlantic could glean much of interest and assistance from it.

"Fertilizers and Crop Production." By Dr. L. L. Van Slyke. 8vo. xv + 493 pp. (Orange Judd, New York, 1932.) \$3.25.

This is something more than a mere book about manures, for it gives in clear and logical fashion, and in not too technical language, the main principles of plant physiology so far as nutrition is concerned, and the main principles of chemistry so far as is necessary for an intelligent knowledge of manures and their action. The practical application of the principles is naturally illustrated principally by reference to agricultural crops, but fruit crops, chrysanthemums, and other garden crops are also referred to, with suggestions for their proper manuring.

"Gardens and Gardening: The Studio Gardening Annual, 1933." Ed. by F. A. Mercer. 1a. 8vo. 128 pp. (Studio, London, 1933.) 7s. 6d. Paper cover.

This is in the main a series of pictures in black and white of gardens at home and abroad. There are also well-illustrated articles on Shrubs, the Small Garden, Perennials, and some uncommon or new plants. The illustrations are, of course, well reproduced.

"The Penny Guide to the Allotment Gardening." Anon. 12mo. 44 pp. (Friends' House, London [1932].) 1d.

A great deal of information has been squeezed into this little book, which is designed to assist the allotment-holders that have been called into being by the action of the Society of Friends in several parts of the country. It is an excellent pennyworth. Cultural operations, crop rotations, manurial treatments, a calendar of work to be done, provision against pest attacks, are all dealt with.

"Rubber Latex." By H. P. and W. H. Stevens. Ed. 2. 8vo. 156 pp. (Rubber Growers' Association, London, 1933.)

The booklet deals with the properties, composition, coagulation, concentration, manipulation and compounding of latex and latex pastes, and its stabilization for industrial purposes, the vulcanization of latex and latex products, dipping and electro-deposition and the marketing and applications of latex. A final chapter provides a selected list of over 500 recent British patents. An index to the text and to the patents, together with a very full bibliography of books of reference and literature, are included and should prove very useful.

"Fifty-two Week-end Jobs in my Garden." By A. G. L. Hellyer. 8vo. 105 pp. (Collingridge, London [1932].) 1s. 6d. Stiff cover.

A calendar of operations divided into fifty-two parts and telling not only when but how to do various things, from digging and seed-sowing to making a lawn and a rock garden, dealing as well with the greenhouse and the tool-shed as with the fruit and flower garden outdoors.

"Amateur Gardening Annual, 1933." Ed. by A. J. Macself. 4to. 122 pp. (Collingridge, London, 1933.) 2s. 6d. net.

This is a well-illustrated publication dealing with many phases of gardening in the open and under glass, arranged under the months most appropriate for the carrying out of the operations.

"California Gardens." By W. S. Dobyms. la. 8vo. 20 pp. 208 plates. (Macmillan, New York, 1931.) 25s. net.

A very small amount of text explaining the making of the book and briefly commenting upon the influence of Mediterranean countries upon the types of gardens found in California is followed by over two hundred illustrations in black and white. These illustrations are reproduced from photographs and, though the title is "California Gardens," the greater number of them portray architectural features, the plants being, with a few notable exceptions, subordinate to the stonework. The use of water in the surroundings of the house is well shown, and some of the architectural features of houses, patios, and gateways of the Spanish type—which are quite in keeping with Californian conditions—are very beautiful. Plates 174 to 178 show gardens of Cacti and succulents—uncomfortable, scarcely restful, but interesting.

The book is a valuable record of the stage to which garden-making has reached in a new country where gardening is making great strides, where the wonderful climate gives great opportunities, and where perhaps a national type of gardening has still to be evolved.

"Wild Flowers round the Year." By H. M. Coley. 8vo. 220 pp. (Howe, London, 1933.) 5s. net.

The common plants of the countryside are described in simple language and illustrated by excellent sketches and coloured plates. The sequence is largely that of the seasons and the text quotes freely from good authors of the past, but they are not slavishly followed, for from beginning to end the book shows its author to be thoroughly familiar with the plants she describes so well.

We have written "describes," but this is not to be taken as meaning the writing of a bare catalogue of attributes; in this book it means much more, for the meaning of the various structures seen and the parts they play in the economy of the plant form the main theme of the book. The author succeeds in her self-imposed task of showing that the commonest weeds are objects worthy of study and full of interest to anyone who will take the trouble to examine them and think about them.

"The How to Do it Flower Gardening Book." By W. Brett. 8vo. 256 pp. (Pearson, London, 1931.) 5s. net.

Many gardening operations are dealt with in this little book, but in far too many instances they are dealt with in an inaccurate or misleading way. It is impossible to go through the whole book page by page, so we must single out one or two points taken at haphazard. We are advised on p. 28, for instance, to use road-sweepings to lighten heavy soils and are not warned of the dangers of using such sweepings indiscriminately. We are warned (p. 27) against using a flat-tined fork in digging, but are not told why it is wrong. Pages 202, 203 give what purports to be a list of good trees for the garden. There are thirty-seven of them, and among them *Acacia grandiflora* and *Cerasus grandiflora* (neither of which exists), forest trees like Ash, Larch, Oak, the white Pear, whatever that may be (*Pyrus communis* is the name attached—that belongs to any Pear), *Rhamnus catharticus* and other things quite unsuitable for a small garden and some for any garden at all—no crabs, no species of *Prunus*, and none of the beautiful Maples from abroad, only *Acer campestre* in the genus being mentioned—this in spite of the great host of ornamental trees now available. The advice on making a rock garden (p. 211) is far from good, and the selection of plants for the rock garden, while not as bad as that of trees, is poor. Only one *Primula*, *P. villosa*, is mentioned, only one *Sempervivum*, no *Phlox*, only the genus *Hypericum*, most species of which are emphatically not suitable for the rock garden, only one *Narcissus* (*N. triandrus albus*), *Olearia*! And so on.

Enough has been said to indicate that this book is not one to be solely relied upon by the beginner in gardening, however good much of the advice it gives may be.

"Improvement of Woodlands." By W. E. Hiley. viii + 250 pp. (Country Life, London, 1931.) 10s. 6d.

This is an excellent treatise on the management of woodlands under British conditions, and in addition to the chapters dealing with the selection of species to plant, planting and maintenance, it contains one on "How to combine Sport with Forestry," written by the Hon. N. A. Orde-Powlett. He shows that sport and forestry are not incompatible, though the planting of certain species is to be eschewed when sport is combined with forestry. It is a book we can confidently recommend to the attention of those who are concerned in woodland management.

"Flowers and Folk-lore from Far Korea." By Florence Hedleston Crane. 4to. 93 + 4 pp. 45 plates. (The Sanseido Co., Tokyo, 1932.) 75s. net.

This is a handsome volume of coloured drawings of the best-known wild and cultivated Korean flowers, with English and Latin names, and a certain amount of text. Though but a small country, the flora of Korea comprises over 3,000 species. Many of the species figured have been in cultivation for a long time, and the volume will be of interest to gardeners at home, as well as to residents in Korea.

The selection is a representative one, and the plants appear to be well named, though a curious slip occurs on Plate XVIII, where *Lilium tigrinum* is named *L. lancifolium*. Several drawings are portrayed on each plate, and in all there are figures of 148 species. The drawings are bold representations in colour-wash, possessing a certain amount of freshness, which gives a good impression. They vary considerably in quality, the collection of species inside the cover, for instance, being not so attractive as many others in the body of the work. Botanical detail is omitted, and there are no formal descriptions of the plants. The letterpress consists of facts, folk-lore, and verses, which the author tells us "have been gathered from the literature and learning of that fast-disappearing character, the old Korean scholar; or snatched in fellowship with this poetic people, whose tales, like their lives, inevitably end in tragedy."

"Practical Botany." By F. Cavers. 8vo. 426 + xvi pp. (University Tutorial Press, London, 1931.) 5s. 6d. net.

The third edition of this well-known text-book is similar to the last, but includes an important appendix by Mr. L. C. Fox, dealing with reagents required for microchemical and physiological experiments.

"The English Flower Garden and Home Grounds of Hardy Trees and Flowers only." By W. Robinson. Ed. 15. 8vo. xix + 720 pp. (Murray, London, 1933.) 18s. net.

It is given to few authors to prepare a new edition of the book they wrote and published fifty years before, and which has already passed through fourteen editions. Such a book needs no praise to recommend it. It has an assured place by popular acclaim, and all we need to do is to extend it a warm welcome in its renewed youth. The book has helped generations and will help more, and Mr. Robinson's pen has lost nothing of its trenchant power, though held by a hand grown old in fighting for what he believes to be the truth. Doubtless, like all reformers, he is sometimes too absolute, and the truth regarding grafting, for instance, lies less removed from common practice than he would have us believe; nevertheless reform is desirable there.

Those who know the old editions will want this. Those who do not should not delay in securing this new one.

"French Intensive Gardening." By A. J. Macself. sq. 8vo. x + 128 pp. (Collingridge, London [1932].) 7s. 6d. net.

A careful account of the French system of raising vegetable and salad crops on a small area in a short time is given in this book, and the author has been at pains to compare methods approximating to the French in use in our own country. We commend the book to all who are inquiring as to the possibilities of producing early crops in England, though we would suggest further inquiry on means of heating soil in frames and on the varieties of the various crops to plant.

"The Plant World in Florida." By Dr. Henry Nehrling. Ed. by A. and E. Kay. 8vo. xviii + 304 pp. (Macmillan, New York, 1933.) 18s. net.

Dr. Nehrling went to Florida in 1886 and planted two experimental gardens there, the first at Gotha, the second after the great frost of 1917 in southern

Florida. He had an intense love for, and interest in, tropical plants, in growing them, in ascertaining their correct names, and in bringing their beauties before others. He published many notes upon his experience and the knowledge he had gained in growing them and studying them in the Journal of the Florida Horticultural Society, and in The American Eagle, and these notes have now been collected and edited and published in a readily accessible form.

The plants are arranged in fairly well-defined groups, as, for instance, Shade Plants, Flowering Shrubs, Palms, Bamboos, Climbing Plants, Orchids, and so on. In these groups the plants are placed under their botanical names alphabetically and notes of their characteristics and behaviour in Florida are given in simple language.

The book is a guide to planting in subtropical climates where the temperature in summer is about 80°–90° F. and in winter rarely falls to freezing point. It is furthermore a good guide to the "common" names of cultivated tropical plants, since these are usually given and are well indexed.

"Shrubs and Trees for the Garden." By A. Osborn. 8vo. 576 pp. (Ward, Lock, London, 1933.) 21s. net.

"When the cost even of only a moderately large selection of trees and shrubs is borne in mind, and when one considers the annoyance of finding after a few years that they are, through size, habit of growth or nature, possibly unsuitable to their position, it will be realized that the comparatively small sum spent on a book that will really assist in the selection, planting and maintenance of the trees and shrubs in a garden is money well invested." So the Editor (p. 7), and all very true. It gives a yard-stick by which to measure the book. Let us apply it here and there.

There is excellent instruction on the preparation of the ground, planting and similar matters, though the information regarding manures is not such as all would subscribe to, but there is of course nothing in all this that cannot be found in other books. We might have been told how to encourage the rotting of garden refuse, but are not. It is to selection, and to details of pruning that we must especially look to see whether the book gives full measure. We want, say, March and April flowering trees and shrubs—and we want the best. Page 49 should advise us. Here should come among others *Prunus incisa*, well enough known now, *Prunus subhirtella pendula*, old in gardens, and other Japanese cherries—all good, and indeed indispensable. They are not mentioned. Or we want Autumn tints and we turn to p. 58 to find no mention of *Prunus Sargentii*, or *Euonymus alatus*, or *Eucryphia pinnatifolia*—all very good things, as the author must know full well. Why omit them, while among flowering shrubs *Clematis calycina* (only suitable for favoured places) and *Parrotia persica* (as correctly spelt in April, or *Parrotia Persica*, as it is given in March) are included as ornamental flowering shrubs. This sort of thing does not recommend the book, nor does the use of archaic names, especially by an author who has the whole resources of the great botanic garden in which he serves at his disposal.

Even when we turn to the section headed "Small Selections of the Best Trees and Shrubs" we are disappointed. The finest evergreen for British gardens is not mentioned—the Holly. Who would prefer *Viburnum Tinus* or *Veronica Traversii* in the greater part of the country to the Holly in any garden large enough to contain either of those mentioned?

The greater part of the book—pp. 237 to 536—is occupied with an alphabetical list of "Flowering and Ornamental Trees and Shrubs." The term "flowering" as opposed to ornamental is redundant, for flowering is a common attribute of trees and shrubs (*pace* those who instance "tree ferns"), and in a book of this kind one would suppose that the criterion for inclusion was "ornamental." Yet time after time we find things—"subjects" our author calls them—included that have no real claim. Who, outside a botanic garden, desires to grow *Brunnichia cirrhosa*, *Buckleya distichophylla* or *Bumelia lycioides*, for instance? Who can claim—besides the author—any striking ornamental value for *Eucommia ulmoides*, for instance? Interesting it is, but not worth planting for ornament. There would be little cause to complain at their inclusion if it were not that really ornamental things were often omitted.

Buddleia alternifolia is mentioned only in the paragraph on "Culture," where it is not quite accurately described; *Prunus Sargentii*, *P. incisa* and *P. Conradinae*—all good plants—are not mentioned at all. Both lists might easily be greatly extended.

Why does the author persist in calling so many Conifers by wrong names? If he had no other guide, he had the recently published "Report of the Conifer Conference" to aid him.

The book was well conceived, but is poorly executed. Enthusiasm perhaps has outrun discretion in many instances. Careless haste has led to many errors; and lack of a sense of proportion to the production of a book far less valuable than it might have been. Challenging comparison with Bean's "Trees and Shrubs" it falls lamentably short.

"Natural Rock Gardening." By B. H. B. Symons-Jeune. 8vo. 151 pp. (Country Life, London, 1932.) 10s. 6d. net.

Should it be decided that a garden would be improved by the introduction of a fine cliff, a bluff or a great outcrop of stone, then this book would prove the best guide possible for the transportation of one of Nature's own rock gardens from some bleak hillside to form a contrast with the gentle slopes or level spaces of its new home.

Its author has brought the mountain to Mahomet so frequently and so well, that his persuasive pen and admirable photographs lead the reader to believe it is neither difficult nor expensive to perform similar manifestations of magic.

This natural rock gardening on a large scale is suitable for large gardens only. Beautiful as the finished picture may be, fitted into the right framing, it should be screened away from the larger landscape. Seen from a distance an isolated bluff would appear as insignificant as do the Pyramids when seen from a point so near that they have lost the blue mystery of distance, and yet so far away that the size of their blocks fails to impress. The examples of the rocks placed at Lingholm, Keswick, prove the skill of the artist and the wisdom of adding rocks to such a suitable landscape. Perhaps it would not be so pleasant to look upon a bluff and a pool, such as was at Chelsea Show in 1923, from the windows of one's house every day, and especially on those that were gloomy and damp.

The planting of a natural rock garden calls for severe restraint and much learning.

The Aubrietia and Juniper clad rocks of Mt. Parnes rising out of turf spangled with the fiery orange of *Crocus aureus* and drifts of *Anemone blanda* of deepest blue provided a perfect picture on a March day. If copied ever so perfectly and naturally in an English garden there would be many months of the year when they lacked the colour that provides the chief charm.

So the author wisely preaches that it is the beauty of form in the stones, planted with dwarf Conifers, silver Saxifrages and other grey-leaved and compact plants that should be sought after.

The chapters on Conifers are excellent in spite of careless proof-reading of names, a blemish that reaches its peak further on in *Cotoneasta*, *Dianthus neglectus* and no fewer than nine needful corrections on p. 17, without counting an unpleasant habit of denying capital letters to genuine names even when in the singular.

"Flower Painting in Oil and Water-Colours." By H. Davis Richter. 8vo. 51 pp. (Winsor & Newton, London [1932].) 3s. 6d. net.

In the foreword we read :

"It is assumed that the student wishes to obtain proficiency in painting floral forms as normally seen ; truth of representation therefore being the first essential, but little attention has been paid to artistic licence."

On p. 41 :

"If . . . the painting has to have any decorative significance, the effect of the completed scheme must be visualised and all unessential elements sacrificed. The flower no longer asserts itself as an individual—it has to take its place as a member of the community."

The practical advice given in this book is excellent as to materials, technique, composition and appliances, but it will be found of greater use to those who wish to introduce "floral forms" into still-life pictures so that they "no longer assert" themselves, rather than to those who aim at "truth of representation" in flower portraits.

The writer's pictures are always beautiful, but one cannot help feeling that the flowers are introduced as concomitants or foils for the metals, mirrors and china figures that are the star performers in the arrangement—things of colour for light and shade to play upon, rather than living organisms possessing exquisite characters of venation and texture.

"The Garden of Pleasant Flowers. A Handbook for Amateurs." By Edith Grey Wheelwright. 8vo. 407 pp. (Gerald Howe, London, 1932.) 15s. net.

A pleasantly written little book into which it has been attempted to cram too much. This has led to some confusion. It seems strange to find hedges of

Cupressus macrocarpa, *Lonicera nitida*, chestnut paling, and *Tropaeolum polyphyllum* in a chapter devoted to "The Flowering Shrubs."

It is full of useful information however and shockingly bad spelling of plant names. It is to be hoped that the amateurs for whom it is intended will study and follow the practical advice and by the use of a good gardening dictionary make corrections where needed. It would be a useful exercise in plant nomenclature and orthography.

"The Book of the Garden." By A. Stanley. 8vo. 265 pp. (Nicholson & Watson, London, 1932.) 6s. net.

In these pages we have a series of essays dealing with gardens and gardening in various phases in a very readable way, well printed and arranged, and with a few head-pieces reproduced from pen sketches which are, however, rather heavy.

The first six chapters trace the history of garden-making up to Victorian gardens; then follow chapters on Garden Cities, City Gardens, The Planning of Gardens, Garden Colour, Providing for Alpines, Gardens within Gardens, Oxford and Cambridge Gardens, Gardens in America, Italy, and other Foreign Lands, The English Garden To-day, and The Use of Gardens.

A wide field is thus covered, necessarily rather cursorily.

"Down the Garden Path." By Beverley Nichols. 8vo. 290 pp. (Cape, London, 1932.) 7s. 6d. net.

This is an eminently readable book by an accomplished writer, who claims to be but a beginner in gardening. That may be—and we can only hope he will go on learning and will tell us about it. Even though he gather old knowledge, if he put it in a new dress and present it in such pleasant fashion we shall welcome it.

We read mainly of adventures—adventures in housekeeping, encounters with neighbours, experiments in making a garden out of an inchoate area occupied by neglected plants.

Perhaps a harsh winter or two will modify some of the author's expectations of flowers that may be had at that season of the year, but if the book does no more gardening good than to emphasize the fact that flowers do appear in the open air in winter, it will have accomplished something very valuable.

Only in favoured places can one hope for all those mentioned in the enthusiastic chapters on winter flowers to succeed, but many will succeed even in the least-favoured and yet we seldom see them.

The reader will meet people he knows well in these pages if he be a gardener, and difficulties he has had to encounter too, and he will enjoy reading of them.

"In Search of Wild Flowers." By J. F. Rayner. xiii + 139 pp. (Watts, London [1933].) 1s. 6d. net.

This little book is No. 13 of the "World of Youth Library, Outdoor Section," and it deals with common wild flowers, as such introductions to the study of Botany should do. The flowers are grouped under their habitats—woodlands, fields, hedge-climbers, seashores, and so on, and eight to twelve plants found in each of these habitats are described. The plant is supposed to be beside one when one reads the book so that the description may be verified and understood, and in many instances clear drawings help the identification and the understanding.

It is an excellent introduction for any beginner who desires to gain knowledge of the structure of plants.

"The Fantastic Clan." By J. J. Thombeer and F. Bonker. xiv + 194 pp. (Macmillan, New York, 1932.) 18s. net.

There is almost a spate of books about Cacti, some of them written by the cultivator, some by the botanist, some by the collector. The present one is mainly concerned with a description of the species of Cacti native in Arizona, New Mexico, Texas, and California, and it gives notes on their identification, their distribution, and their peculiarities. To this is added notes on cultivation, mainly, of course, from the American point of view. Many species are figured by means of excellent photographs or line drawings and a few by coloured plates. All this is well done and for the most part will be found very useful.

The rest of the book consists of interpolated chapters and paragraphs descriptive of the scenery and of the plants as they grow in the desert. Much of this is good too, but it is marred too often by defects of style. What, if we take

it literally, can we make of: "And now the borealis of desert color has passed us by in its rush to the coolness and stillness of the desert night, only to recuperate and renew its gay attire and appear in fresh array of hue and tint in the morrow's pearly dawn"?

"Florida Wild Life." By C. T. Simpson. 8vo. xii + 199 pp. (Macmillan, New York, 1932.) 12s. 6d.

Except that the members of the Miami Garden Clubs to whom this book is dedicated have made possible its publication there is little direct connexion between its contents and horticulture. There are interesting notes here and there on the growth habits of certain plants, sometimes in their native habitat, sometimes when transplanted into cleared ground, but beyond that not very much for the garden-lover.

A considerable part of the book is devoted to lamentations concerning the changes that the exploitation of Florida has wrought in the constitution of the flora and fauna, and we are asked to execrate those responsible. That, of course, is quite a common attitude, but not every author is so naive as to describe, cheek by jowl, his own exploits in diminishing the wild life of the district. We do not know whether the author is a conchologist—he is certainly a collector of shells. "At Cape Sable I found a sandy bank partly washed away, and just below water there were hundreds of them [the great Angel wings, *Pholas*], though when I left the place they were scarce" (p. 22). In another instance he speaks of gathering quarts of one species.

Further, the occasion of changed names—sore enough to bear for most of us—is used to decry the efforts of those who try to get at the prior name of a plant and who try to ascertain its close relationships. While we deplore the necessity for altering plant names, those to whom understanding is given must needs forgive, for only so can eventual stability be reached. Not content with this, he sets up windmills to tilt at—coining imaginary names which are untenable according to the rules of botanical nomenclature and even quoting them in the index as though they existed.

Possibly, however, much that is said is exaggeration, for we read that *Agave americana* and *Opuntia Ficus-indica* "occupy every inch of waste land or uncultivated country over hundreds of square miles" in S. Europe, and the author regards this as some repayment for the "weeds" that have been introduced to Florida from Europe—and (p. 83) "Europe is also fecund in the matter of people and she is as liberal in scattering them around as she is with her useless plants; she has pretty well filled our country with her human weeds to our great detriment."

Doubtless the author had some purpose—possibly good—in writing this book—but it is not evident.

"Rock Gardens and Alpine Plants." By T. W. Sanders. Ed. 4. Edit. by A. J. Macself. 8vo. 196 pp. (Collingridge, London [1931].) 7s. 6d. net.

This new edition of a well-known book follows closely its predecessors with the addition of a few names and the deletion of certain paragraphs of criticism upon the old rock-garden at Kew. Water, bog, wall and moraine gardens are all dealt with.

"101 Things You should know about Gardening." By H. A. Smith. 8vo. (Collingridge, London, 1931.) 1s. 6d. Limp cover.

This book is composed of short articles from the beginners' pages of *Amateur Gardening*. It is an interesting and accurate compilation dealing with a great variety of matters which occur to the gardener from time to time: What is humus?; Blindness in Plants; Forms of Glasshouses, Earthworms—these are some of the titles.

"Simple Rock Gardening." By A. J. Macself. ix + 128 pp. (Collingridge, London [1931].) 2s. 6d.

The difficulties which confront the would-be cultivator of Alpine plants are discussed, then follow directions for the making of a rock garden, and annotated lists of plants suitable for the beginner and for the enthusiast. The latter will probably find the book insufficient, the former will find it very helpful, and to him we can recommend it.

"All through the Year." By M. E. Phillips. 8vo. 156 pp. (McDonald, San Francisco [1931].)

Mrs. Phillips has set out to tell how a garden may be made pleasant and interesting on the Pacific coast of the United States the year round, and she has done it well. This part of America is favoured with a delightful climate, but it still shows the procession of the seasons and it still calls for care in selecting and planting so as to ensure that each season brings the plants and flowers proper to it. Not only has Mrs. Phillips pointed out how to do this, but she has also given many hints on the arrangement of a garden so as to get from it the maximum of pleasure—to make it a place of beauty and tranquillity. A few of the plants mentioned we are unable to trace, because the names are given in unfamiliar form, perhaps through typographical errors—and one illustration labelled "Fragrance in the Garden" seems to be astray, for it depicts Maidenhair Ferns, Rex Begonias, Streptocarpus and an unrecognizable dwarf plant.

"A First Book of Biology." By M. E. Phillips and L. E. Cox. 8vo. 270 pp. (University Press, London, 1933.) 2s. 6d.

A book for children dealing with the lives of common plants and animals, written in simple language and adequately illustrated.

"The Arrangement of Flowers." By Mrs. W. R. Hine. 1a. 8vo. xiv + 147 pp. (Scribner, New York and London, 1933.) 12s. 6d.

There are not many books dealing well with the arrangement of flowers for vases and tables, but here we have one that will repay study and suggest methods.

The author owes and acknowledges a debt to the Japanese and to books like those of Josiah Condor and Mary Averill. She does not slavishly copy the Japanese style, but suggests arrangements which may better appeal to Western tastes where those tastes are not informed by the legend, lore, and superstition that form the background of much of the art of floral arrangement in Japan.

The suggestions made are illustrated by a series of well-reproduced photographs in black and white. These show the form but fail to convey the colour of either flowers or containers. To have attempted this would have made book unduly expensive and might well have failed of its object, for mechanical reproduction of flowers in colour is not yet perfect, and is often far from pleasing unless very expensive methods are used.

A great deal of attention has been paid to the possible use of flowers not yet commonly available for house decoration, and the chapter devoted to this matter is well worth study, as is that dealing with containers. Containers of various sorts are well illustrated and wisely commented upon. Some, it is well said, are better left empty. Some are to be treasured as gifts but not exposed to the dangers of daily use. Some gifts, and others bought perhaps at quite a moderate price, are suitable for common use since they fit well both their surroundings and the purpose to which they are put.

The last two chapters deal with exhibits and exhibiting, and with judges and judging, and are both worth reading.

We had almost written a complaint that foliage did not come in for its proper share of consideration, but that would be unjust since the title of the book is "The Arrangement of Flowers." Still we go so far with the Japanese in that we think that at times flowers may be incidental and secondary in a decoration. Foliage, fruits and even naked branches may well play their part. The author of this book does not ignore this, but neither does she devote a chapter to it, as she might well have done, for there is wide opportunity for such use, at any rate in autumn and winter, in this country.

"The Apple." By Sir H. Daniel Hall and M. B. Crane. 8vo. 235 pp. (Martin Hopkinson, London, 1933.) 10s. 6d.

From the preface we learn that this is a work for the "practical" man. It is roughly divided into two halves. The first is a masterly summary of the genetic work done at Merton by Mr. Crane, and the second half is a treatise on the growing of apples for the commercial grower.

The preface recognizes in some measure the slight want of congruity in the two sections, but in defence argues that a good workman will like to know all that may be known about his job.

The first part will be indispensable to all who are undertaking the raising of

new fruits and especially apples, and the introductory exposition of the chromosomes and their segregation, etc., is clear and full. The reason of incompatibility in certain crosses is pictorially demonstrated in a way which should be easily apprehended by the veriest tyro.

The tables of the enormous number of cross-fertilizations made at Merton are impressive and instructive. We cannot, however, in all cases make the implied assumption that what happens to a young pot tree under glass will always be repeated in outdoor conditions and with older trees. Orchard experience suggests that in some cases at least the mass-growing of "self-sterile" varieties is possible and even profitable. As the authors say in regard to manuring, "experiments must give way to working experience when they are at variance."

The second half of the book treats of the lay-out of the orchard, planting, manuring, stocks, etc., and it must be said that there are several books available in which fuller information will be found. The all-important question of costs is not dealt with. Pruning receives nine pages only and is naturally somewhat summary.

We regret to meet the oft-repeated statement that Irish Peach forms terminal buds "instead of spurs," which is not correct. It has a tendency to form fruit buds on young lateral growths as do many weak-growing apples and pears, but older trees form spurs freely.

The selections of apples are those now established as market varieties, with a further recommendation of certain new varieties of promise. In a list for the small garden 'Baumann's Reinette' is recommended as of "pleasant" flavour and for both cooking and dessert. 'Ontario' might with advantage be substituted for this.

In view of the hybrid nature of this book and its value we look forward to an F2 edition, and the authors will then have a chance to consider whether the dominant and recessive sections might not well be segregated into two works. Should this be so a few corrections might be made.

The use of "Type" for a Paradise Stock which is a clone should lapse, being neither in accordance with botanical usage or correct English.

A demonstration of the fact that fruit buds are formed in late summer should be emphasized, as it has very important cultural significance.

The cordon apple named on Plate 22 as Lord Grosvenor is certainly not that variety, neither fruit nor leaf having the remotest resemblance to it. We might hazard a guess that it is either 'Cox's Orange' or 'Laxton's Superb.'

The statement (p. 189) that the R.H.S. gives awards to fruit "very largely on a dish of fruit set before the Committee" is not exact. First-class certificates for many years have only been awarded after an inspection of the original tree when in fruit.

"An Introduction to Tropical Soils." By Dr. P. Vageler. Translated by Dr. H. Greene. 8vo. 240 pp. (Macmillan, London, 1933.) 15s. net.

The general purpose of the book is to assist the planter in choosing and managing his land. The author approaches the study of tropical soils from a consideration of the mineral components, which are there of greater relative importance than in the temperate regions. The earlier chapters are concerned with the recognition by microscopical and chemical technique of soil particles. The soil fauna and flora are not dealt with in detail.

The deductions that can safely be made from such mineralogical examinations are presented to the reader in non-technical terms. In Africa, where soils rich in mica are frequently of a deeper colour than those of a low mica content, the vegetation is richer and better developed on the former, indicating a better food supply for the plants. Sometimes the division between such areas is sharply defined. Again, the local occurrence of gypsum in semi-humid regions is frequently associated with a soil rich in humus and bearing a "savanah"-like vegetation. The well-known red earths rich in secondary iron and in aluminium minerals generally are poor in available phosphates.

Horticulturists will be interested in those sections (chapter 3 particularly) dealing with sources of humus in tropical soils, for in forest peats often extending to coastal areas, as in Sumatra and Borneo, many highly valued plants have their native home. In the primeval forests the rate of humus formation is rapid, more than 100 tons an acre a year; but so quickly is the humus decomposed by biotic agency that the yearly accumulation may be insignificant, and the surface layers of humus remarkably shallow. Forest areas, despite their attractive appearance, may frequently form only inferior plantations, as the prolonged leaching of the soil has resulted in a low content of soluble plant foods.

Where the humus layer was deeper, as in parts of India, tea and oil palm plantations flourish on forest land.

The text is rich in practical advice: for example, "In hot climates attention to the subsoil conditions is much more urgently advisable than in temperate climates"; and again, "Poor soil with good transport is better than good soil without." The chapter on soil selection is the outcome of the author's many years of experience in the tropics: it cannot be too highly commended to anyone seeking to earn a livelihood by planting in such latitudes.

Generally, the translation has been well done, the text reads freely. The plates showing soil profiles and vegetation photographs are good; there are also smaller text figures of mineral particles and crystals. The value of the book is enhanced by a short appendix of references to the literature compiled at Rothamsted by the Imperial Bureau of Soil Science. The book is presented in the usual format adopted by the publishers. While the practical grower in the tropics is particularly indebted to Drs. Vageler and Greene for sound advice, the general student of soils and crops will also welcome this book.

"The Romance of Plant Hunting." By F. Kingdon Ward. Ed. 2. 8vo. x x 277 pp. (Arnold, London, 1933.) 3s. 6d.

This is a reissue of Capt. Kingdon Ward's book of 1924 in another form, making now one of the volumes of the "Kingfisher Library." A list of plants identified with the collector's numbers has been added as an appendix.

"Our Friendly Trees." By Barbara Briggs. 1a. 8vo. 121 pp. (Lutterworth Press, London, 1933.) 8s. 6d.

This book would make an excellent present for a child. It is written in simple language and the illustrations are good, those in black and white being very good, of excellent line and conveying the spirit of their subject in an uncommon degree.

"Garden Ponds and Pools: their Construction and Maintenance." By A. E. Hodge. 8vo. 129 pp. (Witherby, London, 1933.) 5s.

Not only is the construction of ponds described, but notes on plants which may be grown are given. There is, however, no warning as to the spread of these to an undesirable extent—an event that may happen with many of those mentioned and bring disappointment and despair in its train. Fishes are also described and the ways to treat them in sickness and in health, so that the book deals with most of the important matters likely to arise.

"Plant Ecology for the Student of British Vegetation." By W. Leach. 8vo. 104 pp. (Methuen, London, 1933.) 3s. 6d.

The literature of Ecology has grown to such enormous proportions and has increased the number of words a complete dictionary of the English language must contain to such an extent that those interested in the natural vegetation of Great Britain will welcome this slim book. It gives a clear summary of the results of the study of plant communities and the causes that determine them, so far as Great Britain is concerned.

"Methods in Plant Histology." By C. J. Chamberlain. Ed. 5. 8vo, xiv + 416 pp. (University Press, Chicago, and University Press, Cambridge, 1932.) 18s. net.

The first edition of this book appeared over thirty years ago, and as it has been revised several times and almost entirely re-written, so as to bring its contents up to date and to include clear directions for carrying out the most appropriate methods of manipulation of plant material for study, it has gained an assured place in the botanical laboratory. It is, indeed, indispensable there. This new edition contains clear descriptions of the treatment of very difficult material so as to make it amenable for study, and some excellent advice on the preparation of drawings and photographs for book illustration. The last matter is one that not only those who deal with histological preparations might well read and profit by—those whose duty it is to prepare books would bless them.

The book, as is to be expected, is well printed in clear type and well illustrated.

"A Picture Book of Evolution." By C. M. Beadnell. 8vo. ix + 309 pp. (Watts, London, 1932.) 10s. 6d. net.

This book is the outcome of an attempt to revise Mr. Dennis Hird's "Picture Book of Evolution," published about twenty-five years ago. But it is like the woodman's axe (as the present author says)—the same old axe but fitted with a new haft and a new blade. It is, at any rate, a very readable production, and though the illustrations of evolutionary processes are drawn almost entirely from Nature outside the vegetable kingdom it is a book which will prove exceedingly interesting to all who wish to know what has been discovered of the sequence of life on this earth and of the place of the earth itself in the scheme of the Universe. It is, as a Picture Book should be, very well illustrated, and a commendable feature of the book is the short notes on people who have contributed to our present knowledge of the matters dealt with. This list is not complete—neither is the book—but it is all of interest.

"Wall, Water and Woodland Gardens." By Gertrude Jekyll. Ed. 8, revised. xvi + 246 pp. (Country Life, London, 1933.) 15s. net.

Miss Jekyll's book on wall, water, and woodland gardening is too well known to need praise to commend the new edition to an even larger public than already knows and values it. The necessary revisions of the older text have been made, but the book remains substantially as it was and embodies the mature knowledge, wisdom, and judgment that, combined with her artistic perception, clarity of thought, and directness of diction, made Miss Jekyll's works so acceptable, and her influence so potent. Miss Jekyll's new chapter, completed only a little while before she died, on woodland gardens will be read and studied by many to whom this form of gardening represents the highest stage of gardening art. A chapter on Asiatic Primulas has been added, Mr. G. C. Taylor being the author. The number of these Primulas suitable for "wild gardening" made available through the explorations of the past thirty years in western China is now considerable, and selection and discrimination in their choice and planting need to be exercised. In these directions Mr. Taylor's article will be of very considerable value.

"Culinary Herbs and Condiments." By M. Grieve. 8vo. 209 pp. (Heinemann, London, 1933.) 5s. net.

Mrs. Grieve has dealt with her subject with her customary thoroughness. The major part of the book is concerned with the description of the thirty odd sweet and pot herbs that are grown (at times) in English gardens, with their cultivation and their uses. The uses are fully dealt with, as the following list for mint will show (pp. 95-98)—mint and cream cheese sandwiches, mint chutney, mint vinegar, mint and peas, mint sauce (3 recipes), iced mint punch (3 recipes). One would scarcely expect to find Walnuts among culinary "herbs," but pp. 144-146 are devoted to the walnut. Part II, pp. 149-175, describes the brewing of herb beers, the making of herb wines, of herb liqueurs, and of herb teas, while Part III deals with condiments—salt, pepper, vinegar, mustard, etc., and winds up with some notes of the best types of cooking utensils.

"English Leaves." By E. V. Lucas. 8vo. x + 169 pp. (Methuen, London, 1933.) 5s. net.

The claim to notice in our JOURNAL of this series of essays lies in the one entitled "A Beautified of England." This is the one among many charming and interesting "Leaves" which is of greatest interest to us as gardeners, for it is a eulogy of one of England's greatest gardeners, Miss Gertrude Jekyll. It is a quiet, harmonious appreciation written by a master of harmonious English who knows how to appreciate beauty in the homely arts, concerning one whose great ideal was quietness and beauty and harmony in the garden and the home.

"Memories of the Months." By Sir Herbert Maxwell, K.T., F.R.S. Series 2 and 3. Ed. 2. 8vo. xiii + 379 + xiii + 439 pp. (Maclehose, London, 1932.) 6s. each.

These "pages from the notebook of a field-naturalist and antiquary" and, one may add, man of letters and man of affairs, gardener and artist, now revised and added to, have been republished, and the event gives us an opportunity to draw the attention of those who are not yet fortunate enough to have read them, to a series of essays of the widest possible appeal to the country-lover. One almost envies him who has yet to make their acquaintance, the pleasure in store for him—but not quite, for we who have are not satiated by their first perusal, we still may have the pleasure of reading and enjoying them again.

What do the books contain? The index to the three volumes given at the end of the third series tells us, and a quotation will give an idea of their wide range. Here are the first few items:—Abbotsford, Acacia, Access to Mountains Bill, Acclimatisation of foreign species, Adders, King Alfred, Amhuinn, *Ampelopsis japonica*.

"Simple Greenhouse Management." By J. S. Dakers. 8vo. 129 pp. (Collingridge, London [1932].) 2s. 6d.

There is a great deal of wise advice in this little book—not the least important of which is the frequent insistence upon the need for cool treatment of many of the plants one may grow in the cool greenhouse, or one with but little heat. The amateur with a small greenhouse will find the book very useful.

"Garden Management." By H. S. Orloff and H. B. Raymore. 8vo. 302 pp. (Macmillan, New York, 1932.) 12s. 6d. net.

This is a book of outdoor gardening for America, dealing with trees and shrubs, lawn, flower and rock gardens, seed raising, propagation and the like. It is a book of a type of which we have many useful examples, and contains much excellent advice clearly expressed.

It is unusual to find an outspoken statement in an American book to the effect that "commercial fertilizers do no permanent good to garden soils," and while we are convinced that the best results cannot be obtained by such fertilizers alone, we cannot subscribe to the whole of the implications of that sentence. It is, however, true that "there are many, many commercial fertilizers with tricky names that often take in the unwary" and have a longer or shorter life.

"Gardening with Herbs for Flavor and Fragrance." By Helen M. Fox. 8vo. xvii + 334 pp. (Macmillan, New York, 1933.) 18s. net.

This book will be very valuable to the American gardener. Mrs. Fox, in a clear, unaffected way, gives the results of her three years' adventures in gardening with herbs. She has made a very extensive search in many countries which has resulted in her growing some three hundred herbs. In this book there are practical and useful descriptions of fifty-eight herbs, which are the most valued in cooking and flavouring. The statement, however, that the "most important of all uses of herbs is their function as condiments in food and drink" would make anyone pause who had the most casual knowledge of the British Pharmacopœia.

Mrs. Fox draws our attention to the atrophied state into which we have allowed our senses of taste and smell to get. Her culinary recipes should do a great deal to remedy this, for they sound delicious. English readers, especially, could learn a great deal from this part of the book. The word fragrance, however, in the title seems hardly justified, as she has scarcely touched upon the many delightful usages we have for fragrant herbs in our country houses. It is a book written in the true herbal tradition of love and care and empirical knowledge; so much so, one wishes that the illustrations had that careful and exact drawing one hopes to find in a botanical work.

"Oxford's College Gardens." By Eleanour Sinclair Rohde. 1a. 8vo. 193 pp. (Jenkins, London, 1932.) 42s. net.

Old gardens have a charm all their own, and when they are associated with old buildings, mellowed with the years and with memories of men and women who walked and talked and worked in them, and heard the birds sing, and saw the sun's glint through the trees, or felt the welcome shower upon their faces in the distant past as we may to-day, their charm is many-sided and appeals to a vast number of mankind. Some may have intrinsic beauty: all will have interest. So it is with Oxford's College Gardens, and Miss Rohde has done well to gather together an account of them into one book, and the artist, Estella Canziani, has done well to give us coloured pictures of the gardens of to-day.

We wish the book were longer and that more details were given of the gardens here and there—their making and their content—and that is, of course, because what is given is so interesting. We should like, for instance, to have been told of Mr. Bidder's love for Geraniums, of which he grew so many at St. John's, and not merely that there is a bed full of Dittany, but that he sought in all sorts of out-of-the-way places for various forms of it so as to have as many as possible.

Perhaps it would have been well to get someone with at least half the knowledge of plants that Miss Rohde has of books to read the proofs—thereby

some errors and more annoyance would have been avoided, for it is annoying to see a plant name printed *saxifraga Burseriana* (the generic name is always worthy of a capital) and we should not have been told that the "little double campanula—*c. Loderi*" was of Mr. Gerald Loder's raising. That great and generous gardener owed it rather to his brother Reginald.

We are sorry to have to write this little grumble, for Miss Rohde has written us a book full of learning, full of the stuff that sets us thinking of the past and of the great men who took pleasure in their gardens, of the pioneers in plant growing and of the history of the growth of the institutions around which these old gardens have developed.

"Simplified Gardening." By G. W. Butcher, E. Jackson and R. Sudell. 8vo. 243 pp. (Benn, London [1933].) 5s. net.

It would be refreshing to pick up a new book on popular gardening which gave us the latest and best advice without including misleading and even quite inaccurate matter. We should like to be able to acclaim such a book.

Here we find the old—often too old—advice re-dished. We are advised to grow Brown Bath Cos Lettuce, for instance, a variety no one really needs; no advice is given as to the varieties of Parsnips; 'Pioneer' is the only Pea mentioned, and so on. We turn to the Perennial Flower section and find it stated that hardy Cyclamens are good for the February garden, but they are not mentioned for August and September; Narcissi for March, but not April; *Iris nudicaulis*, whatever that may be, for the same month; *Aster Amellus* for October, but not for August and September, when they are at their best; Gladiolas for certain months; Red-hot Pokers, *Iris reticulata*, Winter Aconite for December, and so on.

If we did not know that those for whom such books are written soon rise superior to their guides we should despair of English gardening.

Even such a hint as that certain (specified) perennials are handicapped if planted in autumn would have been helpful, but there is none.

"Spring Flowering Bulbs." By C. L. Thayer. 8vo. 128 pp. (Kegan Paul, Trench, London, 1928.) \$1.25.

Tulips, Narcissi and Hyacinths provide the text for the greater part of this little book. Other bulbous plants mentioned are Anemone, Chionodoxa, Crocus, Eranthis, Erythronium, Fritillaria, Galanthus, Leucojum, Muscari, Ornithogalum, Ranunculus, Scilla, but of many of these stocks are small in the States, and restrictions on imports do not favour their further cultivation.

It is curious to read that Crocus corms are frequently infected by a fungus disease which causes rapid decay. Crocuses are peculiarly free from such troubles here.

"Bush Fruit Production." By R. A. Van Meter. 8vo. 126 pp. (Kegan Paul, Trench, London, 1928.) \$1.25.

"Berries" in American gardens differ a good deal from those cultivated here, and it is of these that this little book tells. The Red Raspberries of America are little grown in England, since their yield is usually less than that of our own varieties in this climate; black and purple varieties are practically unknown here, and yellow varieties are not grown there. Blackberries, save for the Himalaya berry, which the author states (wrongly, we think) is a Burbank seedling, are also quite different from ours. Dewberries we do not grow. Red Currants are more popular in America than White or Black, and in some districts the growing of the last is illegal. The Red varieties, Cherry, Fay and London Market, are known over here. Of Gooseberries few European varieties succeed, and the American varieties are all small compared with most of ours. Blueberries (*Vacciniums*), Huckleberries (*Caylussacia*) and Bilberries are not much grown here, but when we have learned how to do it probably the Blueberries will be worth while cultivating in England. The industry is restricted to New Jersey in the States at present.

"The Principles of Potato Production." By E. L. Nixon. 8vo. 123 pp. (Orange Judd, New York, 1931.) \$1.25.

The major part of this book relates the practice and principles of potato-growing as understood by Messrs. Terry and Fritch. As these growers obtained crops three times as heavy as the average of their neighbourhood they had, at least, results on their side. Heavy dressings of humus-producing material, thorough cultivation, and at least weekly spraying with Bordeaux mixture seem

to be the main points, provided reliable seed is used. The first two are certainly of chief importance in England, but possibly less frequent spraying. The champion yield spoken of is about 600 bushels to the acre, a yield by no means uncommon in this country where good cultivation is practised.

"Chemistry and Physics for Botany Students." By E. R. Spratt. 8vo. 223 pp. (Clive, London, 1929.) 3s. net.

This is a useful series of exercises designed to demonstrate the facts of elementary physics and chemistry so far as is necessary to a general understanding of the environment of plants and the influence it has upon the life of the plant.

"Jedermanns Gartenlexikon: Praxis und Theorie im Garten." By C. Schneider. 8vo. xix + 336 pp. (Bruckmann, Munich, 1932.) M.4.80.

This is a handy book packed full of information upon all sorts of gardening matters, including even such things as the development of the ovule, and the changes brought about by fertilization, forms of fruits, and so on, as well as proper depth of planting and the like.

This has been accomplished by the free use of clear diagrams and an abundance of abbreviations and signs. Where abbreviations are frequent it often happens that there is difficulty in getting at their meaning, but that has been overcome by putting the meanings of the abbreviations on a book-mark easily placed against the page one is reading.

"The Garden." By W. E. Shewell-Cooper. 8vo. 125 pp. (Benn, London, 1933.) 3s. net.

The author says he cannot make an excuse for publishing this book, and since there are so many books, and since this adds but little to what has already been published many times, it is difficult to find a reason for it.

On opening such a book one naturally looks for things on which people make mistakes. And we find the only hedges suggested are Yew and *Cupressus macrocarpa*—the latter, for most of the country, probably the least satisfactory of any hedge commonly planted. Shrubs do not enter this garden, not even the Rose. Early potatoes are mentioned, but though 'Sharpe's Express' and 'Ninety-fold' are named, neither 'Duke of York' nor 'Épique' appears; several Raspberries are given, but not that most excellent variety 'Red Cross.' Black Currants are not peculiarly suited to the North and West—they are excellent croppers in Norfolk and Surrey for instance, and so one might go on. Yellows are not conspicuously shown among Michaelmas Daisies in spite of p. 26. Dahlias are quite useful plants in gardens, but are not mentioned; the ignorance of the great variety of available annuals is commented upon on p. 28, but nothing is done to increase our knowledge of that range. It is a very incomplete Garden that is put before us.

"Manual of Agricultural Chemistry." By H. Ingle. Ed. 5. ix + 448 pp. (Benn, London, 1933.) 15s. net.

We have had occasion to notice this useful student's manual in earlier editions and welcome this new one brought up to date by supplementary notes on such of the chapters as needed it, presenting the latest views on the matters treated. We can recommend this book to students of agriculture and horticulture.

"Water Lilies and Water Plants." By A. Niklitschek. 4to. 136 pp. (Chatto & Windus, London, 1932.) 10s. 6d. net.

This is a book we needed. It has been well done, the type, printing and paper are good, the text readable and on the whole reliable, the illustrations excellent.

The instructions for cultivation are very good indeed, and some of us might take to heart the first essential, which is to give as much sun as possible, and the second is often not less overlooked—to give adequate water surface.

Almost all will agree that "the least conspicuous Water Lily is more beautiful than the finest Nuphar," and envy those who can grow the magnificent Lotus, *Nelumbo speciosa*, but that is not for open-air gardens in England, though it flourishes for instance near New York.

Several other plants are dealt with and warning given of the damage some of them are capable of to the Water Lilies one wishes for. Irises come in for scant notice—far less than their magnificence and beauty warrant, and some of

the notes given on various plants may need variation in our climate. *Hottonia palustris* is said to be useless in an aquarium. This is not true for England and a warning of the pervasive qualities of *Limnanthemum nymphaeoides* ought to be given. Like *Elodea canadensis* and the species of *Azolla*, and even *Aponogeton distachyum*, it may prove a very uncomfortable neighbour for less thrusting things.

"The Right Use of Lime in Soil Improvement." By Alva Agee. 8vo. 90 pp. (Orange Judd, New York; Kegan Paul, Trench, London, 1928.) \$1.25.

This book, written by a Director of a State Agricultural College, is designed essentially for the practical man. Technicalities and soil chemistry are not dealt with in detail. The first few chapters deal with soil acidity and mention is made of simple tests by which the need of lime in soils may readily be recognized. Nowadays any gardener can easily test his own soils by means of the soil indicators on the market which give sharply defined colour reactions according to the intensity of the acidity prevailing. The tests outlined in this book have been largely superseded by more refined methods in the chemical laboratory and by the simple methods previously mentioned, for field purposes.

However, the bulk of the text is concerned more with the cure than the diagnosis. The author deals with the various forms of limestone and lime, and the commercial methods of preparation. His short chapter "What shall we Buy?" meets the popular enquiry. Other chapters dealing with methods and rates of application will prove of interest to all growers concerned with such problems.

Although written primarily for American farmers this little book should interest its horticultural readers, for it contains sound advice given by simple writing.

"The Pear and its Culture." By H. B. Tukey. 8vo. 125 pp. (Kegan Paul, Trench, London, 1928.) \$1.25.

An account of pear cultivation in America, where its chief limitations appear to be diseases and pests of various kinds. Bacterial blight is a serious disease and its appearance and spread have led to modifications in cultural methods, so that the old style of pruning has been replaced to a large extent by restricted pruning and quick fruiting. The whole question of treatment of tree and crop as applied to American conditions is dealt with, but there is naturally nothing on wall-trained trees though one is illustrated.

"Roadside Marketing." By G. S. Watts. 8vo. 126 pp. (Kegan Paul, Trench, London, 1928.) \$1.25.

A great deal of good advice on roadside marketing of garden and farm produce is offered in this little book. The insistence of producing what that casual market demands, of offering good stuff at a reasonable price in an attractive fashion, and selling only to a standard grade so that customers may be attracted to come again, is as sound for English conditions as for the American, for which this book was especially written.

"Hardy Evergreens." By F. A. Schrepfer. 8vo. 126 pp. (Kegan Paul, Trench, London, 1928.) \$1.25.

The only evergreens dealt with in this book are Conifers, and that is natural, since broad-leaved evergreens are not sufficiently hardy in the north-eastern States of America to warrant their wide planting. Possibly also the comparatively few native N. American shrubs that have broad leaves, much as we think of some of them, would not appeal to the American gardener in the same way as they, being exotic, do to us. Within its limitations the author has produced a readable and reliable guide.

"The Garden of To-day." By A. Tipping. 8vo. 288 pp. (Hopkinson, London, 1933.) 7s. 6d.

The author has rewritten and pieced together several of the articles from his pen that have appeared under this title in the *Morning Post*, and in doing so has endeavoured to picture a present-day Garden of Pleasure. The result is a readable book with much good advice, especially upon garden planning and construction, and while here and there we find a sentence or two of more topical interest when it was written than it is to-day, such interludes are rare and may

be passed over without further comment and without any great feeling of incongruity. We cannot pass altogether the distressing lapses in the spelling of plant names. These occur much more often in the Index than in the text and we hope that an opportunity may be taken to correct them in both.

"The Study of Cacti." By Vera Higgins, M.A. (Blandford Press, London, 1933.) 7s. 6d.

To review this book raises an interesting question of professional etiquette, for the reviewer is responsible for the foreword.

Mrs. Higgins is Hon. Secretary and Hon. Editor of the Cactus and Succulent Society of Great Britain. Her enthusiasm and that of Mr. Shurly, protagonist, of Mr. Farden and many others, are directed towards making the cultivation of cacti and other succulents not merely a taste for the quaint and the curious in plant life, but a serious and exact science.

The basis of the study of cacti is the monograph on the Cactaceae published by Dr. Karl Schumann in 1898. More than twenty years later, Drs. Britton and Rose published (1919-23) "The Cactaceae," in which they accepted Schumann's subdivisions and classified them under 123 genera, to which many additions have been made in the last ten years. Mrs. Higgins gives a summary of this classification, with a description of a typical species in each genus.

The chapter devoted to "Method of Cultivation" will serve as a model to writers on horticultural questions—it is at once concise and impartial. For a book cannot tell you how to cultivate a plant, it can only indicate general lines, to be incised by experience.

The reviewer welcomes books on these lines, the "handbook" dealing with a particular family; there are too many "little" garden books of a woolly type, to which a good nursery catalogue is infinitely preferable.

"The Study of Cacti" is warmly recommended to all plants-men who may be attracted by the curious and convenient products of the vegetable kingdom commonly grouped as "Cacti."

There is a bibliography, a good index, and a number of pictures.

"Cauliflower and Broccoli Culture." By A. G. B. Bouquet. 1929.

"Muskmelon Production." By J. W. Lloyd. 1928.

"Sweet Potato Production and Handling." By Homer C. Thompson. 1929. 8vo., 128 pp. each. (Orange Judd, New York.) \$1.25 each.

These books are written by professors of vegetable gardening and of olericulture, and are intended for market gardeners. Each volume deals with History, Varieties, Methods of Cultivation, Climate, Manures, Cropping and Marketing.

In Europe the cultivation of the hothouse melon and, to a much larger extent, of the cantaloupe, makes the distinctly inferior muskmelon of little importance or interest. Similarly, the sweet potato is only of importance in countries where what is called in America the "Irish potato" cannot be grown.

The cauliflower is an importation from Europe and is mainly grown in California and Oregon (70 per cent.), and in Long Island (25 per cent.).

The book describes with much detail and illustration market methods, including mechanical cultivation and planting, transport in cold-storage vans, and marketing. The seed comes from Denmark and other European countries, and the varieties are such well-known strains as 'Snowball,' 'Early Dwarf Erfurt,' 'Danish Giant,' and 'Veitch's Autumn Giant.'

These handbooks are well written and concise, and are recommended to every market gardener. For whether you grow strawberries or cabbages for market, the principles are the same. To the present reviewer the ultimate aim of this organized cultivation of vegetables is melancholy—the tin of peas, of carrots, and what you will, for two, four, or eight persons, in the place of "greens" from your own garden or allotment, which, at least, leaves you guessing!

"Roses of Quality." By Charles H. Rigg. 8vo. 93 pp. (Benn, London, 1933.) 6s. net.

The modern book on Roses has become more or less stereotyped, as consisting of two sections: the first giving directions for the cultivation, propagation, and exhibiting of Roses, the second more or less elaborate descriptions of those varieties which the author considers most worth growing or deserving of notice, e.g. the section in Mr. Foster Melliar's well-known book entitled "Manners and Customs."

These descriptions may be confined to garden Roses or may extend to species of wild Roses.

The output of new varieties of garden Roses has for some time past run to from 150 to 200 yearly, of which if two or three are found worth retention the rosarian may consider himself fairly fortunate.

In the circumstances it is natural that the attention of writers on Roses has been very largely directed to an endeavour to estimate the garden value of the plants they grow with a view to the elimination of the less satisfactory varieties.

The author of this little book has confined himself to the second section, and has selected and described 51 garden Roses, of which 38 are classed as Dwarf Roses. These include one H.P. ('Frau Karl Druschki') and two of the new class of Hybrid Polyanthas ('Kirsten Poulsen' and 'Else Poulsen'), the rest being H.T.'s, all of which have appeared since the war (1914); nine are classed as "Climbers" and there are four dwarf Polyantha Roses.

The list given is doubtless a good one, and the descriptions may prove useful. The most serious criticism of the latter is a tendency to dwell on the merits and omit the faults of the Roses described. For instance, in the case of 'Julien Potin,' a Rose of considerable merit, no mention is made of its serious tendency to "ball" in wet weather, owing to which a bed of promising roses may, by a couple of days' rain, be turned into a mass of rotten heads, which can only be cut off and placed in the rubbish heap.

In describing the Australian Rose, 'Golden Dawn,' the author follows the National Rose Society in revising the raiser's description of the Rose as a H.T., and classes it as a Tea—the dividing line between the Tea and the H.T. will perhaps always be a subject of controversy, but there can be little doubt that it is not a pure Tea Rose in the sense that 'The Bride' may be so considered, and this is borne out by its parentage, which is given as 'Elegante' × 'Ethel Somerset,' the latter an H.T., and presumably the seed parent.

Two and a half pages are devoted to Rose species, of which half a dozen are selected as desirable garden plants.

Rosa omiensis (wrongly spelt *omliensis*) is described as a four-petalled Rose. The distinction between this and *R. sericea* has caused some confusion, and is perhaps difficult, but the suggestion has recently been put forward that *R. sericea* should be confined to Roses of the *Sericea* group with four petals, retaining *R. omiensis* for five-petalled forms; and this seems at least to have the merit of convenience. In Lindley's monograph, *R. sericea* is illustrated with five petals, which has generally been considered an error.

The book contains six coloured plates of Roses described in the text, and these are good.

"Popular Gardening Annual." Ed. by H. H. Thomas. 8vo. 136 pp. (Amalgamated Press, London [1933].) 2s. 6d. net.

A very useful little book on all kinds of garden matters for the amateur gardener. It is written in simple style and is full of practical hints.

"The Maintenance of Soil Fertility." By C. E. Thorne. 8vo. xvii + 322 pp. (Orange Judd, New York, 1930.) \$3.

This is written from the agricultural point of view for American readers, and deals fully with its subject, both from the theoretical and the economic standpoint.

"Simple Pruning." By N. Catchpole. 8vo. 130 pp. (Collingridge, London [1932].) 2s. 6d. net.

In this little book care has been taken to show not only the proper way of doing things but the reasons why the things should be done as directed. It will therefore be a guide to the ignorant who desire to be initiated into the mysteries of pruning. Naturally fruit trees occupy the great space, and when indeed one has mastered the methods of pruning fruit trees one is far on towards being completely equipped, for they present many phases and call for varied treatment. Roses, too, are fully discussed, and there is a useful chapter on the pruning of ornamental shrubs, hedge plants and topiary work.

"Simple Gardening." By A. J. Macself. 8vo. 127 pp. (Collingridge, London [1932].) 2s. 6d. net.

A book for the beginner, treating of ground work, hedge-planting, path-making, turfing, flowers and vegetables for the small garden, seed-sowing, pricking out, propagation by simple methods, and the like.

NOTES AND ABSTRACTS.

[For Index of Periodicals quoted see previous volumes.]

Acacia Baileyana F. Mueller. By V. S. Summerhayes (*Bot. Mag.*, t. 9309; April 1933).—Native of New South Wales. A temperate house plant, hardy in favoured places, with grey bipinnate foliage and lateral racemes of golden-yellow flowers in January and February. Introduced 1894.—F. J. C.

Acacias in California. By K. D. Jones (*Nat. Hort. Mag.* 12, pp. 1-44; Jan. 1933; plates).—Many species of *Acacia* are described and arranged in groups according to their use as fragrant wood, forest timber trees, grey-foliaged plants, hedges, pot plants, for river banks, seashore, shade tolerant, small gardens, specimen trees. Illustrations are given of *Acacia alata*, *A. stenoptera*, *A. armata*, *A. calamifolia*, *A. cultiformis*, *A. Cyclops*, *A. decurrens dealbata*, *A. decurrens mollis*, *A. dodonaeifolia*, *A. elata*, *A. hastulata*, *A. Koa*, *A. leptoclada*, *A. longifolia*, *A. melanoxydon*, *A. obliqua*, *A. pentadenia*, *A. pravissima*, *A. pubescens*, *A. pycnantha*, *A. retinodes*, *A. Riceana*, *A. salicina*, *A. saligna*, *A. tenuifolia*, and *A. verticillata*.—F. J. C.

Aichryson dichotomum W. & B. By O. Stapf (*Bot. Mag.*, t. 9294; Jan. 1933).—Annual or biennial. A Canary Island plant with yellow flowers, needing greenhouse protection.—F. J. C.

Apples, The Antiscorbutic Potency of. By M. B. Crane and S. S. Zilva (*Biochem. Jour.* 26, pp. 2177-2181; 1932).—Comparison of the antiscorbutic potency of apple varieties is reported. 'Bramley's Seedling,' 'Belle de Boskoop,' 'Genêt Moyle,' 'Reinette du Canada,' 'Blenheim Orange,' 'Warner's King,' and 'Ribston Pippin,' 'Lane's Prince Albert,' 'Newton Wonder,' and 'Cox's Orange Pippin' all show high activity. The last three are diploids, the others triploids, but the suggestion that triploids are more strongly active than diploids is not proved by these experiments, though there still remains a suspicion that they are generally more vigorous.—F. J. C.

Astragalus utahensis Torrey & Gray. By O. Stapf (*Bot. Mag.*, t. 9302; Jan. 1933).—A perennial herbaceous plant with prostrate branches bearing grey compound leaves and axillary stalked umbels of reddish purple, pea-shaped flowers. A native of Utah, introduced by Mr. Hay.—F. J. C.

Bean, Diseases and Insect or other Pests of, in New York. By W. H. Burkholder and C. R. Crosby (*Cornell Extension Bull.* 58; revised Apr. 1932; figs.).—The dwarf French bean diseases and pests are dealt with in a semi-popular way. In each instance the symptoms of attack on various parts of the plant, the cause and methods of treatment are set out. The diseases are anthracnose due to *Colletotrichum Lindemuthianum*, bacterial blight due to *Phytomonas phaseoli* carried in the seed in the main, mosaic disease—cause unknown—dry root rot due to *Fusarium Martii phaseoli* (*Rhizoctonia* and *Thielavia* also attack the roots), rust due to *Uromyces appendiculatus*, as well as several minor diseases. Seed corn maggot (*Hylemyia cilicrura*), slugs, flea beetles and caterpillars are also dealt with.—F. J. C.

Berberis Jamesiana Forrest & W. W. Smith. By O. Stapf (*Bot. Mag.*, t. 9298; Jan. 1933).—A deciduous shrub up to 8 or 9 feet high, with bright young stems, becoming purple as they age. Flowers small, fruits in racemes, large, bright pink and translucent in early autumn, becoming darker when ripe. Native of Yunnan, Southern Szechwan and Tibet. Introduced by G. Forrest.—F. J. C.

Bulbophyllum patens King. By V. S. Summerhayes (*Bot. Mag.*, t. 9299; Jan. 1933).—Malay, etc. An epiphyte for a warm house.—F. J. C.

Calceolaria plecta Philippi. By O. Stapf (*Bot. Mag.*, t. 9312; April 1933).—Flowers deep mauve with purple-dotted white patch in mouth. Native of Coquimbo province, Chile.—*F. J. C.*

Celery Blight, Importance of Controlling, in the seed bed. By A. G. Newhall (*Phytopathology* 16, pp. 467-472; July 1926; figs.).—The use of copper fungicides on seedling celery to check the attack of *Septoria Apii* is advocated and experimental evidence adduced of marked decrease in the final crop produced where spraying was neglected.—*F. J. C.*

Celery Blights, The Control of. By J. D. Wilson and A. G. Newhall (*U.S. Exp. Sta., Ohio, Bull.* 461; Oct. 1930; figs.).—Three "blights" occur, those due to *Septoria Apii* (late blight), *Cercospora Apii* (early blight) and *Bacterium Apii* (bacterial blight), of which the first is the most serious. Treatment of seed with formalin (1-240) or mercuric bichloride (1 to 1000 water) for 30 minutes reduced the trouble; spraying with copper fungicides such as Bordeaux mixture gave further control. Dust spraying was found more expensive than liquid spraying and not more effective. As many as seven sprayings were given in a season.
F. J. C.

Cherries and Pollination (Kersen). By I. I. Rietsema (*R.K. Land. & Tuinbouwschool, Breda*, 1932; 48 pp.; figs.).—Descriptions of the cherries grown in Holland are given, including notes on the characters of the whole tree, and the varieties are figured.—*F. J. C.*

Cherry and Plum Pollination [Bestuivingsproeven bij kersen en pruimen]. By I. I. Rietsema (*R.K. Land. & Tuinbouwschool, Breda*, 1932, pp. 1-5; figs.).—Experiments in crossing various plums and cherries are reported. The cherries 'Pater van Mansfeld' and 'Drogans Gelbe Knorpelkirsche' did not set fruit when selfed. With the exception of the cross 'Early Rivers' with 'Molenkers' as the pollen parent all cherry crosses tried were successful, and 'Molenkers' crossed with 'Early Rivers' set well.—*F. J. C.*

Cherry, Embryo Abortion in Early-ripening Varieties of *Prunus Avium*. By H. B. Tukey (*Bot. Gaz.* 94, pp. 433-468; March 1933; figs.).—The development of the embryo in the cherry is described, and it was found that there is a stimulation of growth of ovary and ovule coincident with the time of fertilization, but not necessarily initiated by it. Many imperfectly developed fruits may fall early. The author concludes that the proper development of the fruit is dependent upon nutrition, for he succeeded in the artificial culture of normally abortive embryos. No practicable method of supplying the nutrition in normally growing trees is suggested.—*F. J. C.*

Cherry pollination, Experiments in. By O. Einset (*U.S.A. Exp. Sta., Geneva, Bull.* 617; Dec. 1932; figs.).—'English Morello', 'Early Richmond', and 'Montmorency' Cherries proved self-fruitful and pollination with Sour and Sweet Cherries both gave good results. All Sweet Cherries tested proved self-sterile; 'Duke' Cherries proved partially self-fruitful. None of the 'Duke' Cherries proved good pollinators of the sour, sweet, or 'Duke' varieties, but the late-blooming Sweet Cherries seem the best pollinators for 'Duke' varieties.
F. J. C.

***Cistus crispus* Linn.** By O. Stapf (*Bot. Mag.*, t. 9306; April 1933).—The true plant is apparently rare in cultivation, although known for a very long time. It bears rather small magenta or deep rose-red flowers somewhat crumpled at the margins; leaves lanceolate, whole plant with stellate hairs and usually with long silky hairs. Somewhat tender. Native of S. Europe and N. Africa at the western end of the Mediterranean.—*F. J. C.*

Cold Resistance in Evergreens: Further Studies, with Special Reference to the Possible Rôle of Bound Water. By B. S. Meyer (*Bot. Gaz.* 94, pp. 297-321; Dec. 1932).—The resistance of plants to damage by cold is much greater in winter than in summer, and is apparently induced by preliminary exposure for a longer or shorter time to temperatures about 40°-50° F. on a few days. This resistant power is lost when the temperatures rise in spring, and in some species foliage loses its hardiness very quickly during warm spells in winter, in others much more slowly. It has been suggested that the amount of bound water in the foliage was greater in winter than in summer although the total quantity was less, but this was not found to be true in *Pinus nigra*. The author considers "the basis for cold resistance lies in some as yet not understood physico-chemical properties of the protoplasm, which probably cannot be discovered by the gross measurements which are generally employed at present."—*F. J. C.*

Crown Gall on a Conifer. By J. G. Brown and M. M. Evans (*Phytopathology* 23, pp. 97-101; Jan. 1933; figs.).—The occurrence of crown gall on *Cupressus arizonica* in Arizona due to *Bacterium tumefaciens* is recorded. Comparatively little damage was done by the galls, but some of the trees were attacked by a beetle, which lead to the death of tips of twigs. The gall has also been reported on *Juniperus Sabina*.—F. J. C.

Daphne aurantiaca Diels. By O. Stapf (*Bot. Mag.*, t. 9313; April 1933).—An almost glabrous dwarf evergreen shrub with elliptic-ovate leaves about an inch long and fragrant almost orange flowers. Probably hardy. From north-west Yunnan and Szechwan.—F. J. C.

Daphne surell W. W. Smith & Cave. By O. Stapf (*Bot. Mag.*, t. 9297; Jan. 1933).—A shrub from the Sikkim Himalaya and Assam. Flowers ivory-white, faintly scented; foliage dark green, lanceolate. Tender. A greenhouse winter flowerer.—F. J. C.

Eriolobus trilobatus Roemer. By O. Stapf (*Bot. Mag.* t. 9305; April 1933).—A middle-sized deciduous tree with acutely lobed leaves about 3 inches across and large white flowers in clusters. Fruits about an inch in diameter, yellowish-green and waxy. Hardy. Native of the Orient. Synonyms: *Crataegus trilobatus*, *Pyrus trilobata*, *P. trilobata* var. *rumelica*, *Sorbus trilobata*, *Cormus trilobatus*, *Malus trilobata*.—F. J. C.

Euonymus nanus M. Bieberstein. By O. Stapf (*Bot. Mag.*, t. 9308; April 1933).—A dwarf nearly evergreen shrub with large fruits carmine outside, opening to show the scarlet seeds, from S.E. Europe eastwards to Mongolia. Hardy.—F. J. C.

Faucaria Britteniae L. Bolus and **F. Duncanii** L. Bolus (*S. African Gard.* 23, pp. 22, 23; Jan. 1933; figs.).—Two new species of *Faucaria* are described, with a figure of *F. Britteniae*, and a third, so far unnamed, allied to *F. felina* (a figure of which is given) is also figured. *F. Britteniae* is native of the neighbourhood of Grahamstown. It has yellow flowers (purplish without) which expand in the afternoon, and fleshy toothed leaves with marginal spiny teeth.
F. J. C.

Fire-blight Organism and Pathogenic, Fluorescent Group of Bacteria, Comparative Serological and Pathological Investigations of the. By H. R. Rosen and W. L. Bleuler (*Jour. Agr. Res.* 46, pp. 95, 119; Jan. 1932; figs.).—A disease somewhat similar in appearance to fire-blight on pears and apples is described and an account given of experiments made in identifying and differentiating the causal organism. It is concluded that it is distinct from *Erwinia amylovora*, the cause of fire-blight, and identical with *Phylomonas syringae*, the cause of Lilac blight in Europe and N. America. Comparison with *P. citripuleale* (from Citrus) and *P. prunicola* (the cause of plum-wilt) has established the identity of the organisms so named with *P. syringae*, and the authors consider it probable that the fluorescent plant pathogens *P. papulans*, *P. cerasi*, *P. nectarophila*, *P. Barkeri*, and *P. utiformica* are specifically identical with *P. syringae*.—F. J. C.

Fritillaria karadaghensis Turrill (*Bot. Mag.*, t. 9303; Jan. 1933).—A bulbous plant, native of the Kara Dagh mountains in Northern Persia. Differs from *F. crassifolia* in the narrower linear leaves and narrow perianth segments, which are mahogany-red chequered with yellow.—F. J. C.

Fruit-growing in Essex. By O. G. Dorey and J. C. Leslie (*Jour. Min. Agric.* 40, pp. 50-58).—The suitability for fruit-growing of much of the land in Essex is pointed out, and the kinds and varieties of fruit suitable for planting in different districts are discussed. The cost of planting and care for the first few years are given and the preparation of the soil is discussed.—F. J. C.

Fruit-testing, Ten Years of (*Jour. Min. Agric.* 40, pp. 59-62; figs.).—An outline of the fruit-testing carried out at Wisley during the past ten years, with brief notes on outstanding varieties.—F. J. C.

Fruits, Hardy [*A Improdutividade em Pomologia Estudo fisiologico e citologico*]. By J. V. Natividade.—This is an important addition to our knowledge of the development of the flowers of fruit trees and of the parts essential to the production of fruit. It deals with the problems of fertility and sterility and is well illustrated. The sections of buds showing the progressive development of the flower in the bud, beginning on July 5 and at intervals until the following

April 15, are particularly good. A bibliography (pp. 209-229) gives a long list of papers dealing with the subject.—F. J. C.

Gentiana prolata Balf. f. By O. Stapf (*Bot. Mag.*, t. 9311; April 1933).—This is related to *G. ornata* but has no central rosette, prostrate branches and funnel-shaped blue flowers. Native of Sikkim and Bhutan, first grown at Wisley about 1880 and reintroduced. Hardy.—F. J. C.

Gladioli, New (*S. African Gard.* 23, p. 47; Feb. 1933).—*Gladiolus Martleyi*, a rose-tinted white-flowered species, and *G. xanthus*, with yellow flowers, are described by L. Bolus.—F. J. C.

Globba Wintii C. H. Wright. By O. Stapf (*Bot. Mag.*, t. 9314; April 1933).—Herbaceous. Native of Siam. Needing stove-house, flowering with racemes of orange flowers in axils of large bright rose bracts in autumn.—F. J. C.

Haemanthus Nelsonii Baker. By O. Stapf (*Bot. Mag.*, t. 9293; Jan. 1933).—A cool-house plant from the high veldt of the Orange River and Transvaal. Leaves usually two, dark green, firm, fleshy, glabrous; flowers pink in a dense umbel on a scape about 10 inches long.—F. J. C.

Homoglossum Hollandii L. Bolus (*S. African Gard.* 23, p. 47; Feb. 1933).—A description of this red-flowered species is given and the two new combinations *H. Guthriei* (= *Antholyza Guthriei*, *Petamenes Guthriei*) and *H. Vandermerwei* (= *Antholyza Vandermerwei*) are proposed.—F. J. C.

Irises as Hosts of Tylenchus dipsaci, The Bulbous. By G. Steiner and E. M. Buhner (*Phytopathology* 23, pp. 103-105; Jan. 1933; figs.).—Attacks upon bulbs of varieties of *Iris Xiphium*, *I. xiphioides* and *I. tingitana*, from American, Canadian, English, French, and Dutch sources, by the stem eelworm, *Tylenchus dipsaci*, are reported. The infection starts from the side, not the top, of the bulb, showing as a yellow spot beneath the tunics, later becoming leaden grey. The attack appears to be restricted to the bulb, which is eventually killed. Attempts to inoculate Narcissi and onions with eelworms from the Iris were unsuccessful. *Aphelenchoides fragariae* has also been reported from Iris bulbs, producing similar symptoms.—F. J. C.

Leptaloë albida Stapf (*Bot. Mag.*, t. 9300; Jan. 1933).—This, known hitherto as *Aloë Kraussii* var. *minor*, *A. myriacantha* and *A. myriacantha minor*, is made the type of a new genus, *Leptaloë*, to which another species, *L. myriacantha*, is assigned. The plant has the aspect of a small Aloe with greenish-white flowers. It is from the Barberton district of the Transvaal.—F. J. C.

Lettuce, The Control of Bottom Rot of. By G. R. Townsend and A. G. Newhall (*U.S. Exp. Sta., Cornell, Bull.* 535; Jan. 1932; figs.).—Bottom rot is characterized by the decay of the lower parts of the heart, and when severe its complete rotting. The first symptoms are small rusty or chocolate spots on the midribs touching the soil; on bright days the outer wrapping leaves wilt, the heads become brown and slimy, and finally black as they dry. Dark brown sclerotia are found in the heads and soil and brown mould-like mycelium in the heads. The disease is due to *Rhizoctonia Solani*. Mature plants are more subject to attack than young ones. Dusting with ethyl mercury phosphate dust (Du Bay, 738), using about 20 lb. to the acre just before the disease (which is most prevalent in moist warm weather) is liable to appear, gave good results. Other treatments failed. The dusting should be done in any weather when the plants are dry, and the ground should not be cultivated after the treatment. Removal of all refuse from the crop is important.—F. J. C.

Lewisia in their Native Home. By E. J. Newcomer (*Nat. Hort. Mag.* 12, pp. 58-63; Jan. 1933; figs.).—The species named below are described and their habitat and cultural requirements dealt with—*Lewisia rediviva* [*L. triphylla* and *L. pygmaea* are mentioned], *L. Tweedyi* from the Wenatchee Mountains at 2,000-3,000 ft., *L. columbiana*, *L. Howellii*, *L. cotyledon*, *L. Finckii*, and *L. Heckneri*.—F. J. C.

Light from Neon Lamps—its effect [Over de Noodzakelijke Lichtintensiteit bij Bestraling van Planten en Neonbelichting bij Bloemcultures].—By J. W. M. Roodenburg (*Mededeel. v. d. Landbouwhooges. Wageningen*, No. 17; pp. 37; Dec. 1933).—Reports marked increase in growth in tomatoes, cucumbers, Cinerarias, Primulas, Campanulas, etc., when exposed to light from Neon lamps. The greater the intensity up to a point, the greater the growth.—F. J. C.

Lilium dalmaticum and L. Cattaniae. By A. Grove (*New Flora and Sylva* 5, pp. 172-180; April 1933; figs.).—The original descriptions, etc., with which these names are connected are discussed and the conclusion reached that *L. dalmaticum* has no standing, while *L. Cattaniae* is an unspotted dark form of *L. Martagon* (*L. Martagon* var. *Cattaniae*) which may occur in any batch of seedlings of that species.—F. J. C.

Meeonopsis grandis Prain. By O. Stapf (*Bot. Mag.*, t. 9304; April 1933).—Native of the Sikkim Himalaya and Tibet, with sky-blue flowers about five inches in diameter, often solitary, nodding. Plant perennial with hairy lanceolate leaves.—F. J. C.

Nomocharis saluenensis Balf. f. By O. Stapf (*Bot. Mag.*, t. 9296; Jan. 1933).—The synonyms given are *N. tricolor*, *N. aperta* and *Lilium apertum* var. *thibetica*. A native of Yunnan, Burma and Tibet, introduced by G. Forrest, variable in colour, the form figured having six bright rosy flowers spotted within with deeper colour. The plant grows up to a yard high.—F. J. C.

Onion Scales, The Effect of Certain Mineral Elements on the Colour and Thickness of. By J. E. Knott (*U.S. Exp. Sta., Cornell, Bull.* 552; figs.; Jan. 1933).—Soil acidity made little difference in the colour or thickness of onion scales, but both copper and phosphorus made a great difference, though not so much in the yield weight as in thickness of scale and colour. It is suggested that 200 to 300 lb. of powdered copper sulphate should be applied to the acre where the onions produce only thin scales or are of poor colour.—F. J. C.

Onions, Studies of the Downy Mildew, and the Causal Organism, Peronospora destructor. By H. T. Cook (*U.S. Exp. Sta., Cornell, Memoir* 143; figs.; Dec. 1932).—The author corrects the name of the causal fungus, usually given as *Peronospora Schleidenii* to the earlier *P. destructor*, and describes the characteristics of the fungus as seen in cultures and the disease in the onion. "Abundance of moisture, and low temperatures, were found necessary for infection. . . . Fungicidal treatment is not considered a satisfactory method of control. Exclusion of the fungus from new areas, sanitation, and regulation of the environmental conditions, are considered the most promising means of combating the disease."—F. J. C.

Ornithogalum species (*S. African Gard.* 23, pp. 61 and 71; March, 1933; figs.).—Four new species of *Ornithogalum* are described from S. Africa, and the critical characters distinguishing them are illustrated. They are *O. Hermannii* Leighton from Clanwilliam, *O. ranunculoides* L. Bolus from Namaqualand, *O. Brownleei* Leighton from King William's Town, and *O. Richardii* Leighton from Great Bushmanland. *O. Hermannii* has white flowers, *O. ranunculoides* and *O. Brownleei* yellow, and *O. Richardii* flesh-coloured with green veins, expanding only in late afternoon.—F. J. C.

Parasyringa sempervirens W. W. Smith. By O. Stapf (*Bot. Mag.*, t. 9295; Jan. 1933).—A shrub, 6-8 feet high, native of North-west Yunnan and Szechwan, at first called *Syringa*, later put into a new genus with more stony fruits than *Ligustrum*, which it otherwise resembles. Foliage evergreen, flowers white in panicles, fruits blue-black. Hardy.—F. J. C.

Patents, More Plant. By R. C. Cook. **Plant Patent Queries.** By R. S. Allyn. **Plant Patents Issued in 1932** (*Jour. Heredity* 24, pp. 49-64; Feb. 1933).—These articles are the result of the first grants of patents to plants in the United States on the Statute passed on May 23, 1930. Fifty-one patents had been granted up to Jan. 1, 1933. A whole crop of legal questions has arisen (second article quoted) and difficulties of all sorts are pointed out in the first article. The specifications of the patents in many instances show extreme ignorance of plant-breeding and read more like the productions of a quack than serious descriptions of plants and their origins.—F. J. C.

Potatoes, Studies in the Inheritance of the Tuber Colour in. By W. Black (*Jour. Genet.* 27, pp. 314-339; May 1933; figs.).—Five factors were found to be involved in tuber colour inheritance, viz. a basic factor which could not alone produce pigment, a red-producing factor working only in combination with the basic factor, a blue-producing factor working only in the presence of the first two, and a second blue-producing factor similar in its action. An inhibiting factor

completely dominant to the other four when homozygous, incompletely dominant when heterozygous, also occurs.

The quantity of pigment produced appears to be greatly dependent upon environment.—F. J. C.

Primula obconica, root rot [Wortelrot van *Primula obconica* veroorzaakt door *Thielaviopsis basicola*]. By B. A. Tiddens (*Baarn, Holland, 1933*; 80 pp.; figs.).—This thesis for a degree recounts experiments on a disease of the roots of *Primula obconica*, which prove to be caused by the fungus *Thielaviopsis basicola*. Strains of this fungus vary in their power of infecting Primulas, that from *P. obconica* being the most potent. Infection usually comes from the soil, and treatment of suspected soils with soil disinfectants is recommended.—F. J. C.

Primulas, Vegetative Production of. By R. E. Cooper (*New Flora and Sylva* 5, pp. 181–186; April 1933; figs.).—Stem cuttings of *Primula malacoides*, *P. obconica*, *P. Sieboldii* and *P. MacLarenii* may be used for propagation; the crowns of *P. cachemiriana*, *P. rosea*, *P. Normaniana*, some Capitatas, Candelabras and Sikkimenses, *P. involucrata*, *P. yargonensis*, and *P. elliptica* may be divided; *P. eucyclia*, *P. suffruticosa* and *P. reptans* may be increased by layers; *P. Winteri*, *P. sonchifolia*, the Nivalids, *P. macrophylla*, *P. plantaginea*, *P. obliqua*, *P. aemula*, *P. muliensis*, *P. Agleniana*, *P. pulchella* make winter buds which may perhaps be removed from the rosette for propagation; root cuttings of various species may be made, including *P. nutans*, *P. Reidii*, *P. Wattii*, *P. Wollastonii*, *P. elliptica*, *P. Knuthiana*, *P. flexilipes*, *P. pycnoloba*; *P. caldaria* and *P. sertulum* (*P. Loczii*) make runners.—F. J. C.

Regeneration of Mutilated Seedlings. By C. De La Rue (*Proc. Nat. Acad. Sci. U.S.A.*, vol. 10, pp. 53–63; Jan. 1933).—Pieces of cotyledons cut off and placed in Petri dishes on nutrient jelly and on moist filter paper in 41 plants belonging to 19 different families produced roots, and shoots developed in 22 species. Roots were produced from severed hypocotyls in 35 different species when the cut was made just above the "collar," and in four species when it was made just below the cotyledons. Seedlings from which the cotyledons were removed failed to develop their plumules.—F. J. C.

Rhododendron Genestlerianum Forrest (*Bot. Mag.*, t. 9310; April 1933).—An evergreen shrub up to 8–10 feet, with lanceolate leaves and small glaucous deep reddish-purple flowers in terminal racemes.—F. J. C.

Rhododendron sperabile Balf. f. & Farrer. By O. Stapf (*Bot. Mag.*, t. 9301; Jan. 1933).—Found by R. Farrer on the Hpimaw Pass in 1919, at 10,000–12,000 feet altitude. A small bush with lanceolate leaves with a single layer of reddish felt on the underside, easily detachable. Flowers in terminal clusters, bright scarlet, about 2½ inches across. Hardy.—F. J. C.

Sports in Michigan Tree Fruits, Field Studies in Bud. By B. D. Drain (*U.S. Exp. Sta., Michigan, Tech. Bull.* 130; Dec. 1930; figs.).—It is reported that, contrary to general opinion and report, bud sports occur frequently on tree fruits in Michigan orchards. "They are of such common occurrence in some varieties studied that their unintentional propagation has resulted in some instances in considerable objectionable intra-varietal diversity." Such variations have been investigated in *Cherries*, maturity variations, both early and late, productivity, peduncle length, fruit shape, and in other directions; in *Plums* in colour of fruit; in *Peaches* in time of maturity, productivity, flowers and foliage; in *Pears* in fruit colour, skin, and shape; in *Apples* in russetting, size, shape, sweetness, time of maturity, colour. When the fact of variation has been reasonably certain, corroborative evidence by propagation has been sought.—F. J. C.

Stapellas, etc. By E. P. Phillips (*Flow. Pl. of Afr.* 12, no. 47; July 1932; plates).—The following Stapellas are described and figured with coloured plates: *Stapelia gemmiflora hircosa*, *S. Engleriana*, *S. Leendertziae*, *S. glanduliflora*, *S. nobilis*, *S. kwebensis*, *S. parvipuncta*, *Caralluma aperta*, *Huernia barbata*, *H. campanulata*.—F. J. C.

Stigmatostylis radicans Reichb. f. By V. S. Summerhayes (*Bot. Mag.*, t. 9307; April 1933).—Native of southern Brazil, a plant with two-leaved pseudobulbs on creeping rhizomes and small green, red, and white flowers in a simple raceme, suitable for an intermediate house.—F. J. C.

FORM OF RECOMMENDATION.

This Form can easily be detached for use.

THE ROYAL HORTICULTURAL SOCIETY.

VINCENT SQUARE, WESTMINSTER, S.W. 1.

Established
A.D. 1804.



Incorporated
A.D. 1809.

Form of Nomination and Application for a FELLOW
of the ROYAL HORTICULTURAL SOCIETY.

Mr.
Name Mrs.
Miss

Description or Profession

Address

being desirous of becoming a FELLOW of the ROYAL HORTICULTURAL SOCIETY, I being now a Fellow of the Society, beg leave to nominate for that honour, who is desirous of subscribing * guineas a year.

Signed by

Dated this day of 19

And I, the above-named beg leave to apply for admission as a Fellow of the Royal Horticultural Society. And I undertake if and when elected duly to pay my annual subscription of * guineas and to observe the Bye-Laws of the Society and the Rules and Regulations which may from time to time be made under the authority of the same for the government of the Society, as long as I continue a Fellow thereof.

Signed

Dated this day of 19

* Here insert the words *four, two or one.*

N.B.—It would be a convenience if the Candidate's Visiting Card were sent at the same time. Subscriptions need not be sent until after election.

THE ROYAL HORTICULTURAL SOCIETY

Vincent Square, Westminster, London, S.W. 1

Election and Privileges of Fellows and Associates and Terms of Subscription.

1.—Anyone interested in Horticulture is eligible for election and is invited to join the Society. Women as well as men are admissible as Fellows, but firms and corporations are not admissible.

2.—Every candidate for admission as a Fellow of the Society must be nominated in writing by a Fellow of the Society on a Nomination Form, and must himself duly complete and sign the application for admission on the said Form and send it by post or otherwise to the Secretary of the Society. A list of the candidates will be posted in the Society's Hall at least two weeks before the date of election, and no candidate not included in the list will be considered for election. Every election will be made at a meeting of the Council of the Society, the majority of the Members of the Council present and voting to elect or reject the candidate. The Secretary will inform the candidate of his election, and will at the same time send to him a print of the Charter and Bye-laws of the Society.

3.—The Society being incorporated by Royal Charter, the Fellows incur no personal liability whatsoever beyond the payment of their Annual Subscriptions.

FELLOWS.

A Fellow subscribing FOUR Guineas a year (or commuting for Forty Guineas) is entitled—

- 1.—To ONE Non-transferable (personal) Pass and FIVE Transferable Tickets admitting to all the Society's Meetings, and to the Gardens.
- 2.—To vote at all Meetings of the Society.
- 3.—To attend the Lectures.
- 4.—Admission to the Society's Gardens at Wisley.
- 5.—To the use of the Library at the Society's Hall.
- 6.—To a copy of the Society's *Journal*, containing the Papers read at all Meetings and Conferences, Reports of Trials made at the Gardens, and descriptions and illustrations of new or rare plants, &c.
- 7.—To a share (in proportion to the annual subscription) of such surplus or waste plants * as may be available for distribution. Fellows residing beyond a radius of 35 miles from London (by the A.B.C. Railway Guide) are entitled to a double share.
- 8.—Subject to certain fees and limitations, to obtain Analyses of Manures, Soils, &c., or advice on such subjects by letter.
- 9.—To have their gardens inspected by the Society's Officer at the following fees :—
One day, £3 3s. ; two days, £5 5s. ; plus all out-of-pocket expenses.
- 10.—To exhibit at all Meetings, and to send seeds, plants, &c., for trial to the Society's Gardens.
- 11.—To purchase, at reduced rates, such fruit and vegetables as are not required for the experimental purposes of the Society.
- 12.—To recommend any lady or gentleman for election as a Fellow.

A Fellow subscribing TWO Guineas a year (or commuting for Twenty-five Guineas) is entitled—

- 1.—To ONE Non-transferable Pass and TWO Transferable Tickets.
- 2.—To all the other privileges mentioned in Nos. 2 to 12 above.

A Fellow subscribing ONE Guinea a year (or commuting for Fifteen Guineas) is entitled—

To ONE Transferable Ticket (in lieu of the Non-transferable Personal Pass), and all the other privileges mentioned in Nos. 2 to 12 above.

ASSOCIATES.

An Associate subscribing 10s. 6d. a year is entitled—

To ONE Non-transferable Pass, and to privileges mentioned in Nos. 3, 4, 5, 6 and 10 above. Associates must be persons earning their livelihood by working as *bona fide* Gardeners, or employees in a Public or Botanic Garden, Nursery, Private or Market Garden, or Seed Establishment, or Journalists writing for country or foreign papers, and must be recommended for election by Two Fellows of the Society.

AFFILIATION OF KINDRED SOCIETIES.

Local Horticultural and Cottage Garden Societies and Allotment Societies may be affiliated to the Royal Horticultural Society. For particulars apply to the Secretary, R.H.S.

* **SURPLUS PLANTS.** Note: These are plants which are surplus to the requirements of the Wisley Gardens, and as the Garden becomes fully planned, the number available may be diminished.

EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETINGS.

MARCH 8, 1932.

The Hon. ROBERT JAMES in the Chair.

A lecture was given by Mr. W. Hales, A.L.S., on " Small Greenhouses and their Uses " (see vol. 57, p. 235).

MARCH 22, 1932.

SEWELL MEDAL COMPETITIONS.

The Sewell Medal, for the best exhibit of six pots or pans of plants suitable for the rock garden or alpine house.

Amateur Grower.

To Mark Fenwick, Esq., Abbotswood, Stow-on-the-Wold, Glos.

Trade Grower.

To Messrs. Clarence Elliott, Ltd., Stevenage.

A lecture was given by Mr. H. H. Cook on " Violets " (see p. 115).

Chairman, Rev. H. Rollo Meyer.

APRIL 5, 1932.

Mr. C. G. A. Nix, V.M.H., in the Chair.

A lecture was given by Mr. E. Beckett, V.M.H., on " Mushrooms " (see vol. 57, p. 340).

APRIL 14, 1932.

DAFFODIL SHOW.

CHIEF AWARDS IN THE COMPETITIVE CLASSES.

The Engleheart Challenge Cup and a Silver-gilt Lindley Medal, for twelve varieties of Daffodils raised by the exhibitor.

To Mr. Guy L. Wilson, The Knockan, Broughshane, Co. Antrim.

Silver-gilt Banksian Medal, for twelve varieties of Daffodils not in commerce.

To Mr. J. L. Richardson, Prospect House, Waterford.

APRIL 26, 1932.

AURICULA CUP COMPETITION.

The Auricula Cup, presented by Mr. K. D. Corsar, for the best exhibit of twelve varieties of show Auriculas shown by an amateur, was awarded to Clive Cookson, Esq., Nether Warden, Hexham, Northumberland.

A lecture was given by Mr. W. W. Pettigrew, V.M.H., on " Cacti and other Succulents " (see vol. 57, p. 304).

Chairman, Sir William Lawrence, Bt., V.M.H.

ii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

MAY 10, 1932.

Sir DANIEL HALL, F.R.S., Sc.D., M.A., in the Chair.

The first Masters Memorial Lecture was given by Sir Frederick Keeble, C.B.E., M.A., Sc.D., F.R.S., on "Garden Fertility : its origin and maintenance."

MAY 11, 1932.

Sir ARTHUR HILL, K.C.M.G., F.R.S., Sc.D., M.A., F.L.S., in the Chair.

The second Masters Memorial Lecture was given by Sir Frederick Keeble, C.B.E., M.A., Sc.D., F.R.S., on "Garden Fertility : its origin and maintenance."

CHELSEA SHOW.

MAY 25-27, 1932.

Held in the Royal Hospital Gardens, Chelsea.

The following accepted the Council's invitation to assist in judging the exhibits :—

ALEXANDER, H. G., V.M.H.

BAKER, G. P.

BAKER, HIATT C.

BAKER, W. G.

BARNES, N. F., V.M.H.

BEAN, W. J., I.S.O., V.M.H.

BECKETT, E., V.M.H.

BEDFORD, A.

BESANT, W. D.

BLISS, D.

BOWLES, E. A., M.A., F.L.S., F.E.S.,
V.M.H.

BRIDGEFORD, J. M.

CAMPBELL, D.

CHRISTIE-MILLER, C. W.

COOK, C. H.

CORY, R., F.L.S.

COUTTS, J.

CRAWFORD & BALCARRES, The Rt.

Hon. the Earl of, P.C., K.T.

CURTIS, C. H., F.L.S., V.M.H.

FENWICK, M.

GALSWORTHY, F.

GOWER, A. W.

HALES, W., A.L.S.

HEADFORT, The Marquess of

HOLLAND, Sir EDWARD

INGAMELLS, D.

JORDAN, F., V.M.H.

LAWRENCE, Sir WILLIAM, Bt., V.M.H.

LYTTEL, The Rev. Professor E. S.,
M.A., F.L.S.

METCALFE, A. W.

PETTIGREW, W. W., V.M.H.

PILKINGTON, G. L.

PRESTON, F. G.

PUDDLE, F. C.

ROTHSCHILD, LIONEL DE, O.B.E.,
V.M.H.

SANDER, F. K.

SHILL, J. E.

SMITH, H. H., F.L.S.

STEVENSON, T.

STREETER, F.

TAYLOR, G. M.

TAYLOR, J. P.

TITCHMARSH, C. C., N.D.H.

WHITE, A. W.

WHITE, E., V.M.H.

WILDING, E. H.

WILLIAMS, C., M.P.

WILLMOTT, Miss E., F.L.S., V.M.H.

WILSON, GURNEY, F.L.S.

LIST OF AWARDS.

The Sherwood Cup, for the most meritorious exhibit in the show.

To Messrs. R. Wallace, Tunbridge Wells, for a mixed group of Lilies, Rhododendrons, Azaleas and bulbous plants.

The Cain Cup, for the best exhibit shown by an amateur.

To Baron Bruno Schröder, Englefield Green (Orchid grower, Mr. J. E. Shill), for a group of Orchids.

The Orchid Challenge Cup, for the best group of Orchids shown by an amateur in a space not exceeding 60 sq. feet.

To C. G. Osborne, Esq., Marlow (gr. Mr. J. E. Jones).

The Sutton Vegetable Cup, for the best group of vegetables shown by an amateur.

To Lord Riddell, Walton Heath (gr. A. Payne).

Gold Medal.

To Messrs. R. Bolton, Birdbrook, for Sweet Peas.

To Lionel de Rothschild, Esq., Exbury, Southampton, for Orchids.

To Baron Bruno Schröder, Englefield Green, for Orchids.

To Messrs. Alex. Dickson, Newtownards, for Roses.

To Messrs. Carter, Raynes Park, for florists' flowers including Sweet Peas and foliage plants.

To Messrs. Sutton, Reading, for greenhouse plants from seeds.

To Messrs. R. Wallace, Tunbridge Wells, for mixed group of Lilies, Rhododendrons, Azaleas and bulbous plants.

To Messrs. Allwood, Haywards Heath, for Carnations and Pinks.

To Messrs. C. Engelmann, Saffron Walden, for Carnations.

To Messrs. L. R. Russell, Richmond, for stove and greenhouse plants.

To Messrs. H. G. Alexander, Westonbirt, for Orchids.

To Messrs. Charlesworth, Haywards Heath, for Orchids.

To Messrs. McBean, Cooksbridge, for Orchids.

To Messrs. W. Cutbush, Barnet, for bog and water garden.

To Mr. G. G. Whitelegg, Chislehurst, for rock garden.

Silver-gilt Flora Medal.

To Messrs. Dobbie, Edinburgh, for Sweet Peas.

To Sir Jeremiah Colman, Bt., Reigate, for Orchids.

To R. Paterson, Esq., Ardingly, for Orchids.

To Messrs. J. Waterer, Sons & Crisp, Bagshot, for Rhododendrons and Japanese Maples.

To Lady Aberconway and the Hon. Henry McLaren, Bodnant, for Rhododendrons, Primulas and Meconopsis.

To Mr. Amos Perry, Enfield, for mixed group of hardy Ferns, herbaceous and bulbous plants.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Messrs. Armstrong & Brown, Tunbridge Wells, for Orchids.

To Messrs. Bees, Chester, for herbaceous and bulbous plants.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums.

To Messrs. J. Waterer, Sons & Crisp, Twyford, for herbaceous plants and Tulips.

To Messrs. J. Cheal, Crawley, for formal garden.

To The En-Tout-Cas Co., Syston, for formal garden.

To Messrs. H. Freemantle, 19 Berkeley Street, London, for formal garden.

To Messrs. R. Wallace, Tunbridge Wells, for informal garden.

To Mr. F. Gomer Waterer's Knaphill Nursery, Woking, for informal garden.

To Messrs. Dobbie, Edinburgh, for Tulips.

To Messrs. Clarence Elliott, Stevenage, for rock garden.

To Messrs. Pulham, 71 Newman Street, W., for rock garden.

To Messrs. Hillier, Winchester, for trees and shrubs.

To Mr. R. C. Notcutt, Woodbridge, for shrubs.

Silver-gilt Banksian Medal.

To Messrs. G. Bunyard, Maidstone, for Irises and herbaceous plants.

To F. J. Hanbury, Esq., Brockhurst, East Grinstead, for Orchids.

To Messrs. Cuthbert, Southgate Nurseries, for Azaleas.

To Messrs. W. Slocock, Woking, for Rhododendrons.

To Messrs. Ben. R. Cant, Colchester, for Roses.

To Messrs. E. Webb, Stourbridge, for greenhouse plants and annuals.

To Messrs. J. Peed, West Norwood, for stove and greenhouse plants.

To Messrs. Black & Flory, Slough, for Orchids.

To Messrs. Stuart Low, Jarvis Brook, for Orchids.

To Messrs. Casburn, Bedford & Page, Trumpington, for rock-garden plants.

To Mr. G. H. Dalrymple, Bartley, for Primulas and Meconopsis.

To Messrs. Clarence Elliott, Stevenage, for rock-garden plants.

To Messrs. Clarence Elliott, Stevenage, for trough gardens.

To Messrs. W. E. Th. Ingwersen, East Grinstead, for alpine-house plants.

To Messrs. M. Prichard, Christchurch, for rock-garden plants.

To Messrs. W. H. Rogers, Southampton, for rock-garden plants.

To Messrs. Wm. Wood, Taplow, for rock-garden plants.

To Messrs. Dobbie, Edinburgh, for Dahlias.

To Messrs. Hewitt, Solihull, for mixed group of Delphiniums, Meconopsis, Lilies, etc.

To Mr. Stuart Ogg, Swanley, for Dahlias.

To Messrs. M. Prichard, Christchurch, for herbaceous plants.

To Messrs. Hillier, Winchester, for formal garden.

To Messrs. Barr, Covent Garden, for Tulips and other bulbous plants.

To Messrs. R. H. Bath, Wisbech, for Tulips.

To Rev. H. Rollo Meyer, Watton, for Tulips.

To Messrs. H. Prins, Wisbech, for Tulips and other bulbous plants.

To Messrs. W. E. Th. Ingwersen, East Grinstead, for rock garden.

To Mr. G. Gaze, Kingston, for rock garden.

To Messrs. J. Cheal, Crawley, for shrubs.

iv PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

To The Donard Nursery Co., Newcastle, Co. Down, for shrubs.

To Messrs. W. Fromow, Chiswick, for Japanese Maples.

To Messrs. G. Reuthe, Keston, for mixed group of Rhododendrons and other shrubs.

To Messrs. L. R. Russell, Richmond, for trees, shrubs, and climbing plants.

To Messrs. J. Waterer, Sons & Crisp, Bagshot, for Azaleas and other shrubs and trees.

To Messrs. G. Jackman, Woking, for Clematis.

Silver-gilt Hogg Medal.

To Messrs. T. Rivers, Sawbridgeworth, for fruit trees in pots.

Silver-gilt Knightian Medal.

To Lord Riddell, Walton Heath, for vegetables.

Silver Flora Medal.

To Mr. T. M. Endean, Laindon, for Cacti.

To Mr. F. Gomer Waterer's Knaphill Nursery, Woking, for Azaleas.

To Messrs. Frank Cant, Colchester, for Roses.

To Mr. E. J. Hicks, Twyford, for Roses.

To Mr. J. C. Allgrove, Slough, for mixed group of shrubs and herbaceous plants.

To Messrs. Oliver & Hunter, Moniaive, for mixed group of Meconopsis, Primulas, and rock-garden plants.

To Messrs. Stuart Low, Enfield, for mixed group of Australian shrubs and Hippeastrums.

To Mr. James Douglas, Gt. Bookham, for border Carnations.

To Messrs. Mansell & Hatcher, Rawdon, for Orchids.

To Mr. A. Gavin Jones, Letchworth, for rock-garden plants.

To Messrs. G. Reuthe, Keston, for rock-garden plants.

To Messrs. Barr, Covent Garden, for Irises and other herbaceous plants.

To Messrs. J. Burley, Richmond, for formal garden.

To Mr. E. Dixon, Putney, for Tudor rose garden.

To Mr. James MacDonald, Harpenden, for grass garden.

To Mr. H. F. Fletcher, St. Asaph, for Tulips.

To Messrs. J. R. Pearson, Lowdham, for Tulips.

To Messrs. Bakers, Codsall, for shrubs.

To Messrs. Burkwood & Skipwith, Kingston, for trees and shrubs.

Silver Banksian Medal.

To The Orpington Nursery Co., Orpington, for Irises and Lilies.

To Mr. F. Gomer Waterer's Knaphill Nursery, Woking, for Rhododendrons.

To Messrs. Chaplin, Waltham Cross, for Roses.

To Messrs. Bakers, Codsall, for mixed group of herbaceous plants and shrubs.

To Mr. H. Hemsley, Crawley, for mixed group of Heliotropes, Lilies, and rock-garden plants.

To Mr. Ernest Ladhams, Godalming, for mixed group of herbaceous plants and shrubs.

To Messrs. Pennell, Lincoln, for Clematis and Statice.

To Messrs. H. J. Jones, Lewisham, for Hydrangeas.

To Messrs. L. A. Lowe, Crawley Down, for Border Carnations.

To Messrs. Cowan, Southgate, for Orchids.

To Messrs. Bakers, Codsall, for rock-garden plants.

To The Brookside Nurseries, Headington, for rock-garden plants.

To Messrs. Kent, Brydon & Haigh, Darlington, for rock-garden plants and shrubs.

To Messrs. Maxwell & Beale, Broadstone, for rock-garden plants.

To Messrs. J. Robinson, New Eltham, for rock-garden plants.

To Messrs. J. Waterer, Sons & Crisp, Twyford, for rock-garden plants.

To Mr. G. E. Welch, Cambridge, for rock-garden plants.

To Mr. W. Wells, jun., Merstham, for rock-garden plants.

To Messrs. Bakers, Codsall, for Delphiniums, Lupins, Astilbes and other herbaceous plants.

To Messrs. Redgrove & Patrick, Seal, Sevenoaks, for herbaceous plants.

To Messrs. Wm. Wood, Taplow, for herbaceous plants.

To The Studley Horticultural College, Studley, for Stocks.

To Messrs. Daniels, Norwich, for Tulips.

To Mr. P. Gardner, Addingham, for rock garden.

To Messrs. W. Cutbush, Barnet, for clipped Box, Yew, and Bay trees.

To Messrs. Fletcher, Ottershaw, for trees and shrubs.

To Mr. W. J. Marchant, Wimborne, for trees and shrubs.

To Messrs. D. Stewart, Wimborne, for mixed group of Rhododendrons, Azaleas, and other shrubs.

To The Yokohama Nursery Co., Kingsway, London, for Japanese dwarf trees, Kurume Azaleas and Wistarias.

To Messrs. G. Jackman, Woking, for mixed group of herbaceous plants, rock-garden plants and shrubs.

Silver Lindley Medal.

To Lt.-Col. L. C. R. Messel, Nymans, Handcross, for Olearias.

Silver Hogg Medal.

To Messrs. G. Bunyard, Maidstone, for Apples.

To Messrs. Laxton, Bedford, for Strawberries.

Flora Medal.

To Messrs. Allen, Norwich, for Roses.

To Messrs. W. Cutbush, Barnet, for Roses.

To Messrs. G. Gibson, Leeming Bar, for mixed group of herbaceous plants, shrubs, rock-garden plants, and ferns.

To Messrs. Kelway, Langport, for mixed group of herbaceous and tree Pæonies and herbaceous and rock-garden plants.

To Mr. T. Smith, Newry, Ireland, for mixed group of shrubs, herbaceous and rock-garden plants.

To Mr. A. Dawkins, 408 Kings Road, Chelsea, for Schizanthus.

To Mr. James Douglas, Gt. Bookham, for Auriculas.

To Messrs. Stuart Low, Enfield, for Carnations.

To Messrs. Keith Luxford, Sawbridgeworth, for Carnations.

To Messrs. H. Dixon, Wandsworth, for Orchids.

To Backhouse Nurseries, York, for rock-garden plants.

To Messrs. J. Cheal, Crawley, for rock-garden plants.

To Hocker Edge Gardens, Cranleigh, for rock-garden plants.

To Messrs. Pulham, London, for rock-garden plants.

To Mr. S. Sims, Draycott, for rock-garden plants.

To Mr. K. Therkildsen, Southport, for rock-garden plants.

To Mr. G. G. Whitelegg, Chislehurst, for rock-garden plants.

To Messrs. Carter Page, London, for Dahlias.

To Messrs. C. Engelmann, Saffron Walden, for Pansy garden.

To Messrs. Perryman, Guildford, for formal garden.

To Messrs. Wakeley, London, for Tulips.

To Messrs. R. Gill, Falmouth, for Rhododendrons and other shrubs.

To Messrs. R. Green, London, for Bay trees.

To Messrs. J. Jefferies, Cirencester, for trees and shrubs.

To Messrs. J. Klinkert, Kew, for Topiary.

To Messrs. Redgrove & Patrick, Seal, Sevenoaks, for shrubs.

Banksian Medal.

To Messrs. C. Engelmann, Saffron Walden, for Cacti.

To Mr. G. G. Whitelegg, Chislehurst, for Azaleas.

To Messrs. C. Engelmann, Saffron Walden, for Roses.

To Mrs. B. Bell, Guernsey, for *Gerbera Jamesonii*.

To Messrs. Bowell & Skarratt, Cheltenham, for rock-garden plants.

To Mr. E. Dixon, Putney, for rock garden.

To Mr. A. J. Simon, Finchley Road, London, for rock garden.

To Mr. H. Hemsley, Crawley, for trees and shrubs.

To Messrs. Sale, Wokingham, for trees and shrubs.

To Messrs. A. Hughes, Guildford, for shrubs.

Silver-gilt Grenfell Medal.

To Mrs. V. Higgins, 28 Northampton Road, Croydon, for water-colour drawings of Orchids.

To Lady Beatrix Stanley, Madras, for paintings of Indian flowers.

Silver Grenfell Medal.

To Miss I. M. Charters, 34 West Avenue, Leicester, for paintings of flowers and gardens.

To Collingwood Ingram, Esq., Benenden, for paintings of Gladiolus species.

To Mrs. A. C. Reeve-Fowkes, Eastbourne, for flower paintings.

Grenfell Medal.

To Mr. W. J. Caparne, Guernsey, for garden and flower paintings.

To Miss M. I. Greenfield, Lindfield, Sussex, for Orchid paintings.

To Miss Anne Lawrence, Burford, for paintings of flowers.

To Miss B. Matchwick, Reigate, for water-colour studies of flowers.

To Miss E. Savory, Chertsey, for flower paintings.

To Mrs. P. A. F. Stephenson, 75 Carlisle Mansions, S.W. 1, for water-colour paintings of Cotyledons.

To Miss Winifred Walker, 28 Rivercourt Road, W. 6, for flower paintings.

To Capt. F. Kingdon Ward, Harlington, for photographs.

JUNE 7, 1932.

SEWELL MEDAL COMPETITIONS.

The Sewell Medal, for the best exhibit of six pots or pans of plants suitable for the rock garden or alpine house.

Amateur Grower.

To Mark Fenwick, Esq., Abbotswood, Stow-on-the-Wold, Glos.

Trade Grower.

To Messrs. Clarence Elliott, Ltd., Stevenage.

A lecture was given by Capt. F. Kingdon Ward, V.M.H., on "Plant Collecting."

Chairman, Sir Daniel Hall, K.C.B., F.R.S., Sc.D., M.A., LL.D.

JUNE 21, 1932.

Mr. R. D. TROTTER in the Chair.

A lecture was given by Mr. F. Streeter on "Strawberries" (p. 11).

JUNE 28, 1932.

AMATEURS' FLOWER SHOW.

CHIEF AWARDS.

Silver Cup, to the most successful competitor in Division A.

To Sir William Lawrence, Bt., V.M.H., Burford, Dorking.

Silver Cup, to the most successful competitor in Division B.

To Mr. H. E. Dunhill, Mount Lodge, Harpenden.

Silver Cup, to the most successful competitor in Division C.

To Mrs. G. Woodburn, Tendring, Clacton-on-Sea.

JULY 5, 1932.

Lt.-Colonel L. C. R. MESSEL, O.B.E., in the Chair.

A lecture was given by Major F. C. Stern, O.B.E., M.C., F.Z.S., on "Chinese Lilies" (see vol. 57, p. 287).

JULY 19, 1932.

CLAY CHALLENGE CUP COMPETITION.

The Clay Challenge Cup, which was offered for award for a new Rose possessing the true old Rose scent, was awarded to Messrs. Chaplin Bros., Waltham Cross, for Rose 'Empress.'

A lecture was given by Mr. J. L. Russell, on "Clematis."

Chairman, The Viscount Ullswater, P.C., G.C.B.

SCIENTIFIC COMMITTEE.

March 8, 1932, Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and ten other members present.

Tulipa edulis latifolia.—Col. C. H. Grey showed flowering plants of a small species of *Tulipa* from China under this name. It is allied to *T. erythronioides*.

Artemisia as stock for *Chrysanthemums*.—Mr. E. G. Baker showed dried specimens of an *Artemisia* which he had received from China through the Department of Agriculture in U.S.A. with the information that it was used as a stock for *Chrysanthemums*, giving, it was said, greater vigour and larger flowers. He had identified it as *Artemisia capillaris*. A second species, described as 'White *Artemisia*,' was said to be used as stock for white *Chrysanthemums*.

Primula juliae aberrant.—A hybrid of *Primula juliae* with sterile flowers and showing phyllody of the calyx was exhibited.

Lilium longiflorum Harrisii with green flowers was exhibited by Mr. Fraser. The same stock had been grown and brought into flower in relays. The first has produced satisfactory flowers, but the second, grown in cooler conditions, had failed in colour. The particulars were, however, not sufficient to enable any definite conclusion to be come to.

Bromus erectus.—Mr. Fraser showed examples of *Bromus erectus* collected on the Hog's Back, and of a sterile state with tall foliage produced in autumn. He also showed a form with pale yellow panicles, and one called *villosus* with downy glumes.

March 22, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and nineteen other members present, and visitors.

Plants from Upper Burma.—Capt. F. K. Ward showed some specimens of plants collected on his last expedition, including a species of *Vaccinium* with large leaves and fruits, *Cypripedium* sp., *Rhododendron insculptum*, *Rhododendron* K.W. 9371, *R.* K.W. 9415, *Berberis* sp. aff. *insignis*, *Prunus* sp. K.W. 9314, *Gentiana Wardii* ?, *G.* sp. K.W. 9979, *G. grata*, *Primula* aff. *Dickieana*, *P.* sp. K.W. 9811, etc.

Centaurea sp.—Mr. J. Fraser showed a series of *Centaureas*, including *C. obscura*, *C. nigra radiata*, *C. nigra surrejana*, *C. Drucei*, *C. nemoralis*, *C. nemoralis f. longifolia*, *C. nemoralis f. radiata*, *C. nemoralis f. minima*, from British sources. Mr. Marsden Jones said that the same types were being found among crosses made purposely as have been found occurring wild and named as distinct wild plants by botanists.

Crocuses for naming.—Mrs. Thompson of Weybridge sent two *Crocuses* from Bosnia and Herzegovina for naming, which were recognized as *Crocus vernus albiflos* and *C. banaticus*.

Narcissus scaberulus.—Dr. Giuseppi sent specimens of this rare species collected by him in Portugal. A Botanical Certificate was recommended for it.

Crassula alpestris was also shown.

April 5, 1932, Mr. G. W. E. LODER in the Chair, and seven other members present, and Mr. BOWLER, visitor.

Propagation of Rhododendrons.—Mr. Bowler, gardener to Sir Stephenson Kent of Chelwood, demonstrated a new method of propagating *Rhododendrons* by root grafting. Two well-developed roots of a *Rhododendron*, e.g. *R. ponticum*, were grafted by veneer grafting one on each side of a fairly ripe shoot of the *Rhododendron* to be propagated, potted, and kept for about a month in a warm frame, by which time the union was usually complete and the plant ready for new quarters (see vol. 57, p. 352).

British Potamogetons.—Mr. J. Fraser showed a series of British species of *Potamogeton*, including *P. natans* and its varieties *polygonifolius* and *coloratus*, and *P. alpinus* and its varieties *rufescens*, *Palmeri*, *lanceolatus*, *gramineus* and *pennsylvanicus* (or *Nuttallii*), with the hybrid *P. × Drucei* = *P. natans × alpinus*.

Kalanchoë tubiflora.—Mr. Endean sent a plant of *Kalanchoë tubiflora* (under the name *K. verticillata*). This is a peculiar plant from Madagascar, etc., with

terete leaves notched at the ends, producing adventitious buds in the notches as in the allied genus *Bryophyllum*.

Primula gracilentia came from the Marquess of Headfort, who had raised it from seed collected by G. Forrest under No. 28529.

April 19, 1932, Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and eight other members present, and Mr. W. van der Weyer, visitor.

Narcissus seedlings.—Mr. van der Weyer showed seedling *Narcissus Telamoniensis* \times *triandrus*, which varied from a form not unlike *N. eystettensis* but had rather pendent flowers, to one much like 'Queen of Spain.' He also showed seedlings from a plant of *N. triandrus* with a split corona, which had given rise to several monstrous forms showing different degrees of splitting and adhesion.

Narcissus Watieri was referred to, having been shown at the Narcissus Show by Mr. G. P. Baker, who had collected it on the Atlas range. It resembles a white *N. juncifolius*. The Committee unanimously recommended a Botanical Certificate to this interesting plant.

Anemones.—Mr. Baker also showed *Anemone Heldreichii*, a species intermediate between *A. stellata* and *A. pavonina*, and interesting from its geographical distribution. He also showed a form near *Anemone palmata* but with very finely divided foliage.

Various plants were before the Committee, including the climbing *Viola dumetorum*, *Sedum fastigiatum*, *Primula* K.W. 6080, which appeared to be a form of *P. chionantha* with dark calyx and dark-stained scapes, *Prunus mutabilis*, and *P. tenuifolia*, which Rehder regards as a form of *P. serrulata*. The last two were from Mr. Collingwood Ingram.

May 10, 1932, Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and seven other members present.

Narcissus seedling.—Mr. Bowles said he had examined the flower of the seedling Narcissus shown at last meeting by Mr. van der Weyer and referred to as resembling *N. eystettensis*, and had found that it consisted of six perianth segments, then six other perianth segments, then six corona segments split completely to the subtending perianth, then perianth segments and corona segments repeated in the usual sequence, ending in a confused mass in the middle.

Various plants.—*Saxifraga maderensis* from Madeira from Major Tristram, a plant apparently allied to *S. latepetiolata*, *Cytisus hirsutus* var. *diffusus* from Mt. Olympus from Mr. G. P. Baker, and *Arum creticum* with unspotted yellow spathes from Mr. Hiatt Baker, were before the Committee. *Aquilegia viridiflora* was also shown from a garden in Devon, where it had made itself much at home.

Rose proliferous.—Mr. Fraser showed a double Rose of the form of 'Jules Potin,' in which the axis had elongated and produced a bunch of flower buds, perhaps from the modified ovaries.

British *Potamogetons*.—Mr. Fraser also showed a series of British *Potamogetons*, including *P. lucens* \times *P. perfoliatus*, *P. Griffithii* (? *alpinus* \times *praelongus*), *P. crispus* var. *serratus*, *P. crispus* \times *P. Friesii*, *P. perfoliatus* var. *ovatifolius*, *P. perfoliatus* var. *rotundifolius*, *P. densus*, and its very narrow-leaved variety *angustifolius*.

June 7, 1932, Sir DAVID PRAIN, F.R.S., V.M.H., in the Chair, and seven other members present.

Conandron ramondiioides leucanthemum.—Mr. Amos Perry sent a white-flowered form of *Conandron ramondiioides*.

Roettlera Forrestii was sent from the Hocker Edge Gardens, raised from seed collected by Mr. Forrest in Yunnan.

Eremurus seedling.—A plant of *Eremurus* was sent to the Committee from Floral Committee B. The Committee considered it to be *E. robustus* var. *Elwesii*.

Geum rivale.—Mrs. M. Maxse sent a curious form of *Geum rivale* in which the gynophore was greatly elongated and the outer stamens were petaloid.

Gladiolus sp.—A yellow *Gladiolus* was sent for naming. Its leaf had a curiously corrugated surface. Mr. Baker took the plant for further examination.

Weeds.—Mr. Fraser gave a list of plants common in the district of Kew as garden weeds, and a list of weeds from his garden which must have come from a considerable distance:

Native Weeds: *Rumex obtusifolius*, Dandelions, *Lappa minor*, *Galinsoga parviflora*, *Stellaria media*, *Anagallis arvensis*, *Polygonum Persicaria*, *Achillea Millefolium*, *Poa annua*, *Veronica agrestis*, *Crataegus monogyna*, *Acer Pseudoplatanus*, *Quercus Robur*, Roses (wild).

Weeds in Garden: *Viola Pesneaui*, *V. degener*, *V. variata*, *Oenothera biennis*, *Scabiosa columbaria* var. *rosea*, *Epilobium Lamyi*, *Calendula officinalis*, *Trifolium repens* var. *purpureum*, *Melissa officinalis*, *Aster Novi-belgii*, *Aster Climax*, *Lychnis coronaria*, *Rubus laciniatus*, *Cosmos bipinnatus*, *Apium Petroselinum*, *Archangelica officinalis*, *Solanum nigrum* var. *luteo-virescens*, *Poa palustris* var. *effusa*, *Impatiens glandulifera*, *Papaver somniferum*, Dahlias.

June 21, 1932, Mr. F. J. HANBURY, V.M.H., in the Chair, and five other members present.

Gladiolus concolor.—Mr. Baker reported that the plant he had taken at the last meeting agreed fully with the descriptions of *G. concolor* Salisb.

Mathiola glabra.—He also showed specimens of a plant originally described by Miller in 1768 under the name *Cheiranthus glabrus*, which bears white flowers very sweetly scented in cloudy weather and at dusk. It was transferred to *Matthiola* by de Candolle, and is nearly related to *M. incana*, but has glabrous leaves.

Fasciated Ranunculus sceleratus.—Mr. Odell showed a broad fasciated stem of this plant.

Limonium sp.—Mr. Fraser showed *Limonium paradoxum* from St. David's Head, *L. transwallianum* and *L. binervosum*. *L. transwallianum* was from Co. Clare and Giltor Point, Pembrokeshire.

Ficus nitida.—A photograph of *Ficus nitida* practically enveloping a tree, taken at La Consula, Churriana, Malaga, was shown.

Rose sporting.—Sir Francis Astley Corbett sent specimens of a Rose said to be raised from seed collected on the Lhasa expedition of 1903 bearing deep pink flowers. From the base, and also from the stem of the parent, shoots bearing pale pink flowers, and botanically distinct in all their parts, were reported to be growing, and Sir Francis had failed to find evidence of grafting or of any admixture of plants. Mr. Bunyard said he expected to be in the neighbourhood of the trees (at Slaugham Place, Sussex) soon, and hoped to call to see them.

July 5, 1932, Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and five other members present.

Peloric form of Calceolaria.—Mr. Fraser showed an example of this not uncommon phenomenon, and of *Exoascus deformans* on leaves of Almond, involving the whole leaf.

British Potamogetons.—He also showed specimens of the alternate linear-leaved species of *Potamogeton*, including *P. acutifolius*, *P. obtusifolius*, *P. pusillus* and its vars. *Sturrockii* and *Friesii*, *P. pectinatus*, *P. interruptus* and *P. filiformis*. Mr. Hanbury expressed his appreciation of the completeness of the collection, and commented upon the occurrence of some of the species in the Norfolk rivers.

Rose proliferous.—An example of the common malformation of the double Rose in which the centre is occupied by a bud was shown by Dr. Voelcker, who also showed a sample of seeds (green and red) of *Pistacia Lentiscus* from Africa. The seeds contain a great quantity of fat.

July 19, 1932, Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and six other members present.

Lathyrus Aphaca.—Mr. Hales showed three forms of *Lathyrus Aphaca* with pale, dun, and black seeds, the black-seeded form bearing the palest flowers.

Atropa belladonna.—He also showed two forms of *Atropa belladonna*, the common, and one with pale fruits.

Thalictrum sp.—Mr. Fraser showed dried specimens of British species of *Thalictrum*, including *T. alpinum*, *T. durens* var. *arenarium*, *T. minus* (= *T. collinum*), *T. majus*, *T. flavum* and its var. *nigricans*.

Aegilops ovata.—Mr. Bowles showed spikelets of this curious grass, which are very difficult to pick up when they fall.

Plymouth Strawberry.—He also showed specimens of the curious form of *Fragaria vesca* described long since.

Gentiana cachemirica.—The Bishop of Gloucester showed a growing plant of this uncommon species from Kashmir, a near relative of *G. Loderi*.

August 9, 1932, Mr. J. W. ODELL in the Chair, and three other members present.

Erica cinerea var. —Sir Oscar Warburg showed a specimen of the form of *Erica cinerea* found in the Cevennes with green sepals, and the British form with purple sepals for comparison.

Salix cinerea.—Mr. Fraser showed a range of specimens from various parts of the country to illustrate the variations found in British plants of *Salix cinerea*. He remarked that a Swedish botanist had considered that all the British examples belong really to *S. atrocinerea*, not to *S. cinerea*, but he thought this needed further investigation. He also showed a specimen which he identified as *S. aurita* × *S. cinerea*.

Fasciated Primula Florindae.—Mr. Odell showed a widely fasciated example of *Primula Florindae* from his garden where, up to now, the plants had been normal in growth.

August 23, 1932, Mr. E. A. BOWLES, M.A., V.M.H., in the Chair, and four other members present.

Senecio vulgaris.—Mr. Fraser showed dried specimens of a number of varieties of the common groundsel, *Senecio vulgaris*, including the vars. *erectus*, *latifolius*, and *multicaulis*.

A number of plants were before the Committee for naming.

FRUIT AND VEGETABLE COMMITTEE.

March 8, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and fourteen other members present.

No awards were recommended on this occasion.

Exhibits.

Messrs. Dobbie, Edinburgh : Potatos for opinion.

C. G. A. Nix, Esq., Crawley : Apples, ' Lord Hindlip,' ' Court Pendu Plat.'

March 22, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

No awards were recommended on this occasion, and the business before the Committee concerned many lots of Apples and Pears for identification.

April 5, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

No awards were recommended on this occasion.

Exhibit.

Messrs. R. Gill, Penryn : Broccoli ' Gill's Challenger.'

April 26, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and sixteen other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. F. Streeter, Petworth Park Gardens : forced Strawberries ' Royal Sovereign.'

Mr. H. Barnett, Reading : Apple for opinion.

Mr. E. A. Bunyard, Allington : Apples ' Sturmer Pippin ' and ' Cox's Orange Pippin.'

May 10, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and thirteen other members present.

No awards were recommended on this occasion.

Exhibit.

Mrs. G. L. Langridge, Horsley : Pears from Kenya Colony.

May 24, 1932, CHELSEA SHOW.

Exhibit.

Mr. F. Streeter, Petworth Park Gardens : forced Strawberries ' Royal Sovereign.'

June 7, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and seven other members present.

No awards were recommended on this occasion.

Exhibits.

R.H.S. Gardens, Wisley : sample of 17 stocks of Radish from the trial grounds at Wisley.

Mr. E. A. Bunyard, Allington : Apples.

June 21, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and ten other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. T. Avery, Hemel Hempstead : Strawberry ' Gaddesden.'

Mr. E. Beckett, Aldenham : ' Newberry.'

The recommendations made by the Sub-Committee visiting Wisley to judge the trials of Radishes were confirmed.

July 5, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and ten other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. C. J. Winn, Plaxtol : Strawberry ' The Winn.'

Mr. H. A. Perkin, Bognor : Cherry for opinion.

xii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

July 19, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and nine other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. H. Hemsley, Crawley : collection of Gooseberries.,

R.H.S.Gardens, Wisley : samples of Sugar Peas from the trial grounds.

August 9, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and twelve other members present.

No awards were recommended on this occasion.

Exhibits.

Mr. F. Streeter, Petworth Park Gardens : Peaches, Nectarines, Plums, Cherries and Apples.

The recommendations made by the Sub-Committee visiting Wisley to judge the trial of late Culinary Peas were confirmed.

August 23, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and seven other members present.

Award Recommended :—

Award of Merit.

To Apple 'Advance,' exhibited by Messrs. Laxton, Bedford, a dessert apple of medium size ; evenly shaped, conical, almost entirely covered with dark crimson flush. The flesh is firm and crisp, juicy and well flavoured, and it should provide a valuable addition to the August-ripening varieties. It was raised by crossing 'Cox's Orange Pippin' and 'Mr. Gladstone.' This variety is now growing in the trial at Wisley and a detailed description of the fruit and the habit, vigour and cropping capacity of the trees will be published in due course.

Other Exhibits.

Messrs. Laxton, Bedford : Blackberry 'Bedford Giant.'

John Innes Horticultural Institute, Merton : Seedling Cherry No. 659.

Messrs. Spooner, Hounslow : collection of Apples.

FLORAL COMMITTEE, SECTION A.

January 12, 1932, Mr. W. CUTHBERTSON, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To The British Flower Marketing Association, London, for cut flowers and plants.

Silver Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Pansies.

To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

To Mr. T. Stevenson, Hillingdon, for Chrysanthemums.

To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Award of Merit.

To Chrysanthemum 'Adrian's Pride' for cutting and market (votes unanimous), from Messrs. Luxford, Sawbridgeworth. A very useful, late, rich yellow decorative variety of good form with broad florets.

To Chrysanthemum 'American Beauty' for cutting and market (votes unanimous), from Mr. T. Stevenson, Hillingdon. An excellent, pure white incurved variety of American origin for Christmas and late flowering.

Other Exhibits.

Mr. I. Godber, Bedford : Chrysanthemum 'White Phryne.'

Misses Hopkins, Coulsdon : hardy flowers.

Windward Violet Farm, Dawlish : Violets.

January 26, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—*Gold Medal.*

To Messrs. Blackmore & Langdon, Bath, for Cyclamen.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Carter, Raynes Park, for Primulas.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses, Pansies, etc.

To Messrs. S. Low, Enfield, for Carnations and greenhouse shrubs.

To Messrs. Wakeley, London, for Hyacinths and other bulbous plants.

Other Exhibits.

Messrs. Engelmann, Saffron Walden : Carnation 'My Love.'

Misses Hopkins, Coulsdon : hardy flowers.

Mr. G. W. Miller, Wisbech : Primroses and Polyanthus.

Uggeshall Rectory Gardens, Beccles : Primrose 'Helio.'

February 9, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Messrs. Sutton, Reading, for Primulas.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations and *Dianthus Allwoodii*.

Banksian Medal.

To Messrs. Carter, Raynes Park, for Crocuses and Primulas.

To Messrs. Engelmann, Saffron Walden, for Carnations and Roses.

To Messrs. S. Low, Enfield, for Carnations, etc.

Selected for trial at Wisley.

Primrose 'Helio' from Rev. A. Ashton, M.A., B.D., Uggeshall.

Other Exhibits.

Misses Allen-Brown, Henfield : Violets.

Messrs. Allwood, Haywards Heath : Carnation 'Dairy Maid.'

Misses Hopkins, Coulsdon : hardy flowers.
 Mr. H. G. Longford, Abingdon : *Lachenalias*.
 Mr. G. W. Miller, Wisbech : Primroses and Polyanthus.

February 23, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for *Cinerarias*.
 To Messrs. Sutton, Reading, for *Cyclamen*.

Silver Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses, Pansies, and *Echeveria retusa hybrida*.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
 To Messrs. Dobbie, Edinburgh, for Crocuses.
 To Messrs. S. Low, Enfield, for Carnations.
 To Swanley Horticultural College, Swanley, for Hippeastrums.

Award of Merit.

To Crocus 'Remembrance' for bedding (votes 10 for, 2 against), from Messrs. Dobbie, Edinburgh. A large violet-purple variety with slightly lighter inner segments. The outer segments are slightly feathered at the base with dark purple.

Other Exhibits.

Messrs. Allwood, Haywards Heath : Carnation 'Sunset Glow.'
 Misses Hopkins, Coulsdon : hardy flowers.
 Mr. G. W. Miller, Wisbech : Polyanthus and Primroses.
 Uggeshall Rectory Gardens, Beccles : Primrose 'Helio,' Violets and Snow-drops.

March 8, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
 To Messrs. Barr, Taplow, for Daffodils and other hardy flowers.
 To Messrs. Carter, Raynes Park, for Hyacinths.
 To Messrs. Engelmann, Saffron Walden, for Carnations, Roses, *Echeverias* and Pansies.

To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.
 To Messrs. Wakeley, London, for Hyacinths, Tulips and Daffodils.

Other Exhibits.

Messrs. Blackmore & Langdon, Bath : Polyanthus.
 Misses Hopkins, Coulsdon : hardy flowers.
 Mr. G. W. Miller, Wisbech : Primroses and Polyanthus.
 Lionel de Rothschild, Esq., Exbury : Hippeastrum 'Impératrice.'

March 22, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Sutton, Reading, for *Cinerarias*.

Silver Banksian Medal.

To Messrs. Barr, London, for dwarf Irises and other hardy plants.
 To Mr. G. H. Dalrymple, Bartley, for Freesias.
 To Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Pansies.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.
 To Messrs. Low, Enfield, for Carnations and other greenhouse plants.
 To Messrs. Prince, Longworth, for Roses.

Other Exhibits.

Mr. W. Jones, Woodford Green : Primulas and Polyanthus.
 Mrs. A. Kerr, Uckfield : unnamed coloured Primrose.
 Mr. H. G. Longford, Abingdon : Primroses and Polyanthus.
 Mr. G. W. Miller, Wisbech : Primroses and Polyanthus.
 Messrs. Prichard, Christchurch : Primrose 'E. R. Janes.'
 Women's Farm and Garden Association, London : Daffodils, Irises, Polyanthus, Tulips and Violets.

April 5, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

Silver Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Pansies.

To Mr. E. J. Hicks, Hurst, for Roses.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Sutton, Reading, for woodland garden with Primroses.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Mr. E. Ballard, Colwall, for Primroses and other hardy flowers.

To Misses Hopkins, Coulsdon, for hardy plants.

To Mr. E. Ladhams, Elstead, for hardy plants.

To Mr. H. G. Longford, Abingdon, for Polyanthus.

To Messrs. Prince, Longworth, for Roses.

Award of Merit.

To Freesia 'Ambrosia' for cutting (votes 10 for, 4 against), from Messrs. C. G. van Tubergen, Haarlem, Holland. Flowers cream, lower petals tinged with orange, 8 to 9 flowers to the spike, 4 out at a time, reverse tinged pale mauve.

To Freesia 'Orchidea' for cutting (votes 14 for), from Messrs. C. G. van Tubergen, Haarlem, Holland. Flowers pale lavender with orange throat, 9 to 10 flowers to the spike, 5 out at a time.

Selected for trial at Wisley.

Cheiranthus 'Golden Rosette,' from Mr. A. J. Cobb, Reading University.

The following received an award after trial at Wisley :

Award of Merit.

To Winter Flowering Stock 'Harbinger,' sent by Messrs. Watkins & Simpson, London. Seed sown August 4, 1931; commenced to flower December 29, 1931. Forty per cent. doubles. Colour mostly rose-pink shades, with a few cream, deep red, lavender and mauve shades. Plants 2½ feet, branching. Flowers double, 1½-1¾ inch across.

Other Exhibits.

The Rt. Hon. the Earl of Bessborough, G.C.M.G., Rowlands Castle: Clivia 'Feste.'

Messrs. C. Elliott, Stevenage: Polyanthus 'Six Hills Strain.'

Mrs. Olaf Hambro, Forest Row: Hippeastrum 'Kidbrooke Park.'

Messrs. S. Low, Enfield: Cyclamen 'Eileen Low.'

Mr. G. W. Miller, Wisbech: Primroses and Polyanthus.

The Dean Gardens, Longniddry: Primroses.

April 26, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Polyanthus.

To Messrs. Chaplin, Waltham Cross, for Roses.

To Messrs. Dobbie, Edinburgh, for Schizanthus.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. B. R. Cant, Colchester, for Roses.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

To Mr. J. Douglas, Great Bookham, for Auriculas.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Pansies.

To Messrs. S. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Sutton, Reading, for Cinerarias.

Banksian Medal.

To Messrs. Adams, Tunbridge Wells, for Aubrietias and Violas.

To Messrs. Blackmore & Langdon, Bath, for Schizanthus.

To Mrs. Bucknall, Doneraile, for Anemones.

To Miss C. Christy, Chelmsford, for Polyanthus, Primroses, etc.

To Misses Hopkins, Coulsdon, for hardy plants.

To Messrs. Ladhams, Southampton, for hardy plants.

To Mr. E. Ladhams, Elstead, for hardy plants.

To Mr. H. G. Longford, Abingdon, for Polyanthus, etc.

To Mr. G. W. Miller, Wisbech, for Primroses, Polyanthus, etc.

To Mr. S. Ogg, Swanley, for Dahlias.

To Mr. C. Wall, Bath, for Aquilegias.

Selected for trial at Wisley.

Aubrietia 'Barker's Double' from E. J. Barker, Esq., Ipswich.

Polyanthus 'Bath Crimson'

Polyanthus 'Bath Fancy'

Polyanthus 'Bath Flame'

Polyanthus 'Bath White'

Polyanthus 'Bath Yellow'

} from Messrs. Blackmore & Langdon, Bath.

Primula elatior, Beamish variety from Mrs. Garnett-Botfield, Albrighton.

Other Exhibits.

Miss E. A. Britton, Tiverton: Polyanthus 'Chevithorne Purple.'

Mrs. Bucknall, Doneraile: Polyanthus 'Garyard.'

H. L. Chouls, Esq., Bridgend: Carnation 'Rose Marie.'

Messrs. Crook, Beaconsfield: Polyanthus.

Edrom Nurseries, Edrom: Primulas.

Mr. D. Foxwell, Balcombe: Sweet Peas.

Mr. A. T. Goodwin, Maidstone: Arums and Rose 'Maréchal Niel.'

Mr. C. Gregory, Chilwell: Primroses and Violas.

Messrs. Jarman, Chard: Pelargoniums.

John Innes Horticultural Institution, Merton Park: *Myosotis* 'Star of Zurich.'

Mr. W. Keep, Enfield: Violas.

R. S. Lynch, Esq., Totnes: Aubrietia 'Mrs. L. K. Elmhirst.'

Messrs. Prichard, Christchurch: Polyanthus 'E. R. Janes.'

Mrs. Torkington, Maidenhead: *Primula* 'Snowflake.'

Mrs. Wigan, Chelmsford: *Schizanthus* 'Danbury Strain.'

May 10, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Messrs. Dobbie, Edinburgh, for *Calceolarias*.

To Messrs. Peed, West Norwood, for *Streptocarpus*.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Mr. E. Ballard, Colwall, for Polyanthus, Auriculas, etc.

To Messrs. Dobbie, Edinburgh, for Dahlias.

To Mr. J. Douglas, Great Bookham, for Auriculas.

To Mr. E. J. Hicks, Hurst, for Roses.

To Mr. Milton Hutchings, Hillingdon, for greenhouse plants.

To Messrs. Jones, Lewisham, for Hydrangeas.

To Mr. E. Ladhams, Elstead, for hardy plants.

To Messrs. Low, Enfield, for greenhouse plants.

Banksian Medal.

To Ardwell Nurseries, Beaconsfield, for Stocks and Larkspurs.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Dobbie, Edinburgh, for Sweet Peas.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Pansies.

To Mrs. Fremantle, Penn, for Polyanthus.

To Messrs. Ladhams, Southampton, for hardy plants.

To Mr. H. G. Longford, Abingdon, for Irises, Tulips, etc.

To Mr. G. W. Miller, Wisbech, for Polyanthus, etc.

To Mr. S. Ogg, Swanley, for Dahlias.

To Messrs. Prince, Longworth, for Roses.

To Messrs. Stark, Fakenham, for Polyanthus.

To Messrs. Sutton, Reading, for Wallflowers.

Other Exhibits.

Mrs. Bernard, Wimborne: *Anemone pavonia* 'High Hall Strain' (A.M. 1927), and selected named varieties—'Cassandra,' 'Demeter,' 'Enna,' 'Persephone,' 'Pluto.'

Messrs. Clark, Dover: hardy plants.

Dr. E. Collins, Merton Park: *Calceolaria* 'Sunrise' and C. 'Dainty.'

Messrs. Crook, Beaconsfield: Polyanthus.

Guildford Borough Council, Guildford: seedling Auricula.

Misses Hopkins, Coulsdon: hardy plants.

Mr. W. Keep, Enfield: Violas.

Messrs. Sutton, Reading: *Primula malacoides* 'Dawn.'

The Dean Gardens, Longniddry: Polyanthus, Primroses, etc.

May 24, 1932 (at Chelsea), Mr. G. W. LEAK, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—

Award of Merit.

To Begonia 'Mrs. W. Dodd' as a greenhouse pot plant (votes unanimous), from Messrs. Blackmore & Langdon, Bath. A tuberous-rooted variety with magnificent double rich apricot flowers shaded with pink on the reverse of the lower petals.

To Begonia 'T. Case Morris' as a greenhouse pot plant (votes unanimous), from Messrs. Blackmore & Langdon, Bath. Another tuberous-rooted variety with very large, deep crimson-scarlet double flowers.

To *Lilium longiflorum* 'White Queen' as a greenhouse plant for cutting and market (votes unanimous), from Messrs. Watkins & Simpson, London. This variety can be flowered within twelve months from seed and bears handsome, pure white, slightly drooping, funnel-shaped flowers.

To Rose 'Olive Cook' for show purposes (votes unanimous), from Messrs. F. Cant, Colchester. A white Hybrid Tea variety of good form slightly flushed with pink at the centre.

To Rose 'Prinses van Oranje' for market (vote 12 for, 6 against), from Messrs. Sliedrecht, Boskoop, Holland. A very free-flowering Rambler Rose with double orange-scarlet flowers. It is a sport from Rose 'Superbe,' and was raised by Mr. G. de Ruiter.

To Rose 'Sir Henry Segrave' for show purposes (votes unanimous), from Messrs. A. Dickson, Newtownards. A large, fully double Hybrid Tea variety of excellent form. The deep lemon-yellow fragrant flowers are carried erect on stout stems.

Selected for trial at Wisley.

Calceolaria 'The Feltham,' from Messrs. Watkins & Simpson, London.

Viola 'T. E. Wolstenholme,' from Mr. K. Therkildsen, Southport.

Other Exhibits.

Messrs. Backhouse Nurseries (York) Ltd., York : Primrose 'Sylvia.'

Messrs. B. R. Cant, Colchester : Roses.

Messrs. Carter, Raynes Park : Cineraria 'Rainbow.'

Mrs. E. Lloyd Edwards, Trevor : Saxifraga 'J. C. Lloyd Edwards' (A.M. 1916).

A. S. Gladstone, Esq., Hungerford : Pelargonium 'Mrs. A. S. Gladstone.'

Mr. H. Hemsley, Crawley : Heliotrope 'The Hon. Mrs. Lowther.'

Messrs. S. Low, Enfield : Rose 'Bentveld' and hardy Pink 'Pam.'

G. Mayer, Esq., Woldingham : Auricula 'Danny.'

Mr. H. P. Read, Brundall : *Chrysanthemum maximum* 'Esther Read' (A.M. 1931).

Messrs. L. R. Russell, Richmond : Caladium 'Princess Elizabeth.'

Messrs. Stark, Fakenham : Polyanthus 'Orangeman' and Tropaeolum 'Firefly.'

Mr. A. W. Warner, Netley : Schizanthus hybrids and Carnation 'The Countess of Hardwicke.'

June 7, 1932, Mr. W. CUTHBERTSON, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Antirrhinums.

Silver-gilt Banksian Medal.

To Messrs. Bolton, Halstead, for Sweet Peas.

To Mr. G. R. Downer, Chichester, for Lupins.

To Messrs. Prichard, Christchurch, for herbaceous plants.

To Messrs. Waterer, Sons & Crisp, Twyford, for Irises and herbaceous plants.

Silver Banksian Medal.

To Mr. J. C. Allgrove, Slough, for herbaceous plants and shrubs.

To Messrs. Allwood, Haywards Heath, for Carnations and Dianthus 'Sweet Wivelsfield.'

To Messrs. Bunyard, Maidstone, for Irises.

To Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Pansies.

To Mr. E. Ladhams, Godalming, for herbaceous plants and shrubs.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Prior, Colchester, for Roses.

Banksian Medal.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums.

To Messrs. Gibson, Leeming Bar, for Iceland Poppies.

To Messrs. Redgrove & Patrick, Sevenoaks, for herbaceous plants and shrubs.

To Messrs. Sander, St. Albans, for Anthuriums.

To Messrs. Wakeley, London, for Irises, Anemones, etc.

Award of Merit.

To *Anthurium Scherzerianum* 'Stella Polaris' as a stove plant (votes 8 for, 4 against), from Messrs. Sander, St. Albans. This handsome variety has a large, broad, ovate, scarlet spathe and a curled orange spadix.

To Rose 'Marinus' for market (votes 10 for, 2 against), from Messrs. Prior, Colchester. An excellent Polyantha variety with bright crimson, semi-double flowers borne in robust long-stemmed trusses.

To Rose 'Paul Crampel' for market (votes unanimous), from Messrs. Prior, Colchester. Another Polyantha Rose of similar type with bright orange-scarlet flowers reminiscent of the well-known Pelargonium bearing the same varietal name. Both these Roses are of Dutch origin and were raised by Mr. G. Kersbergen.

Preliminary Commendation.

To Phlox 'Camla' from Lt.-Col. L. C. R. Messel, O.B.E. (gr. Mr. J. Comber), Handcross. A dwarf, lilac-pink variety with carmine markings. The plant is of spreading habit, and the flowers are so freely produced that they hide the foliage.

Cultural Commendation.

To Mr. F. Streeter, head gardener to Lady Leconfield, Petworth, for magnificent spikes of *Eremurus robustus Elwesianus*.

Selected for trial at Wisley.

Lupin 'Fascinating,' from Mr. G. R. Downer, Chichester.

Lupin 'Joyce,' from Earl Beatty, Reigate.

Phlox 'Camla,' from Lt.-Col. L. C. R. Messel, O.B.E., Handcross.

Other Exhibits.

Messrs. Clark, Dover : herbaceous plants.

G. S. Keillar, Esq., La Couture, Guernsey : Lupin 'Grace E. Fry.'

Messrs. Kelway, Langport : Pæonies and Pyrethrums.

Mr. A. Miles, Bickley : herbaceous plants.

Mr. G. W. Miller, Wisbech : Trollius, etc.

Messrs. Prichard, Christchurch : Pæonia 'Fire Globe.'

Mrs. G. Spring Rice, Penrith : Erysimum (unnamed).

Messrs. Russell, Richmond : Caladium 'Golden King.'

June 21, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Gloxinias.

Silver-gilt Banksian Medal.

To Messrs. Kelway, Langport, for Pæonies.

To Mr. A. Perry, Enfield, for Irises, etc.

To Messrs. Prichard, Christchurch, for Lupins.

To Messrs. Waterer, Sons & Crisp, Twyford, for Irises and Pæonies.

Silver Banksian Medal.

To Messrs. Baker, Codsall, for Lupins.

To Messrs. Barr, Taplow, for Irises and Pæonies.

To Messrs. Bolton, Halstead, for Sweet Peas.

To Mr. G. R. Downer, Chichester, for Lupins.

To Mr. Gavin Jones, Letchworth, for herbaceous plants.

To Mr. E. Ladhams, Godalming, for herbaceous plants.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Rev. Rollo Meyer, Watton-at-Stone, for Irises.

To Suffolk Seed Stores, Woodbridge, for herbaceous plants.

To Messrs. Wakeley, London, for Irises.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Bunyard, Maidstone, for Irises and herbaceous plants.

o Messrs. Dobbie, Edinburgh, for Foxgloves.

o Messrs. Dobbie, Edinburgh, for Sweet Peas.

o Messrs. Easlea, Leigh-on-Sea, for Roses.

o Messrs. Engelmann, Saffron Walden, for Carnations, Roses and Gerberas.

o Messrs. Engelmann, Saffron Walden, for Pansies.

To Messrs. Gibson & Amos, Cranleigh, for Irises, Lupins, etc.

To Mr. S. Goodliffe, Bishop's Stortford, for herbaceous plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Orpington Nurseries, Orpington, for Irises.

To Messrs. Pearson, Lowdham, for Aquilegias.

To Messrs. Wallace, Tunbridge Wells, for Irises, Lilies, etc.

Award of Merit.

To Delphinium 'Blue Gown' for show and cutting (votes unanimous), from Messrs. Blackmore & Langdon, Bath. Flowers large, semi-double, ultramarine-blue with small white eye; spike of good shape; secondary spikes numerous; height 6 feet.

To *Heuchera brizoides* 'Bloom's Variety' for cutting (votes 12 for, 4 against), from Messrs. Bloom, Oakington. This variety resulted from a cross between *H. brizoides gracillima* and *H. sanguinea* 'Trevor Red.' The clear red flowers are borne on good stiff and long stems.

To Rose 'Easlea's Golden Rambler' for cutting (votes 11 for, 4 against), from Messrs. Easlea, Leigh-on-Sea. A Rambler Rose of very vigorous habit bearing shapely, double, clear yellow, fragrant flowers with great freedom.

Cultural Commendation.

To Mr. F. Streeter, head gardener to Lady Leconfield, Petworth, for Gloxinias 'Duchess of York,' 'Fireball,' 'King George,' 'Prince of Wales,' 'Princess Elizabeth,' and 'Snowdon.'

Selected for trial at Wisley.

Perennial Lupin 'Codsall Cream,' from Messrs. Baker, Codsall.

Perennial Lupin 'Malvina,' from Messrs. Baker, Codsall.

Perennial Lupin 'Queen Polyphyllus,' from Mr. G. R. Downer, Chichester.

Pyrethrum 'Mrs. James Kelway,' from Messrs. Kelway, Langport.

The following plants received awards after trial at Wisley:

Award of Merit.

To Aquilegia 'Crimson Star,' sent by Messrs. J. R. Pearson, Lowdham. Plant vigorous, 2 feet, branched; flowers 3 inches diameter, single, spur 1½ inch long, sepals and spur crimson, petals creamy-white tinged carmine; foliage dark green; stems brownish. A good even stock.

To Helianthemum 'Watergate Rose,' sent by W. M. Christy, Esq., Chichester. Plant spreading, 7 inches high, vigorous, foliage grey-green; flowers 1½ inch diameter, rosy-crimson, base tinged orange; anthers golden; very free flowering. Raised by sender.

To Perennial Lupin 'Carmine Queen,' sent by Messrs. W. H. Simpson, Birmingham. Plant 3 feet high; flower-stems 18-22 inches long, branched; flowers ½ inch diameter, ¾ inch long, rosy-carmine; very free flowering. Raised by senders.

To Perennial Lupin 'Minnie West,' sent by Mr. J. T. West, Brentwood. Plant 4 feet high; flower-stems 18-24 inches long, branched; flowers ½ inch diameter, ⅞ inch long; standards rose-pink, centre whitish; wings rose-pink; very free flowering. Raised by the sender.

To Perennial Lupin 'Phyllis Baker,' sent by Messrs. W. H. Simpson, Birmingham. Plant 32 inches high; flower-stems 15-18 inches long, branched; flowers ½ inch diameter, 1½ inch long; standards bright rosy-red suffused orange, wings rosy-red; very free flowering. Raised by Mr. T. Baker.

Highly Commended.

To Perennial Lupin 'Mid Blue,' sent by Messrs. W. H. Simpson, Birmingham. Plant 3½ feet high; flower-stems 18-24 inches long, branched; flowers ½ inch diameter; ¾ inch long; standards violet-blue, small white blotch; wings violet-blue, free flowering. Raised by the senders.

To Viola (Violetta) 'Enid,' sent by D. B. Crane, Esq., London. See Report.

Other Exhibits.

Messrs. Clark, Dover: herbaceous plants.

Miss V. Coverdale, Billericay: Violas and herbaceous plants.

Mr. W. M. Gould, South Walsham: *Chrysanthemum maximum* 'Louise' and 'Winifred.'

Messrs. Gurden, Oxford: *Armeria* 'Barwick Jewel.'

Messrs. Hayward, Clacton: *Dianthus*.

Mr. G. W. Miller, Wisbech: herbaceous plants.

Messrs. Prichard, Christchurch: *Dianthus* 'Gloriosa.'

Viscountess St. Cyres, Lymington: *Anchusa* 'Walhampton Seedling.'

Messrs. Unwin, Histon: *Calendula chrysantha*.

Messrs. Wallace, Tunbridge Wells: *Hemerocallis* 'Venus.'

June 28, 1932, Mr. D. INGAMILLS in the Chair, and nine other members present. No awards were recommended on this occasion.

Exhibits.

Mr. A. Humphrey, Henfield : Begonias ' Peach Blossom ' and ' Sunset.'
Mr. C. H. Taudevin, Wirral : Primula ' Raby Hybrids.'

July 5, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Delphiniums.

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for Pæonies and Delphiniums.

To Mr. T. Bones, Cheshunt, for Delphiniums.

To Messrs. Dobbie, Edinburgh, for Sweet Peas.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Barr, Covent Garden, for Irises.

To Messrs. Chaplin, Waltham Cross, for Delphiniums.

To Messrs. Chaplin, Waltham Cross, for Roses.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Messrs. Van Leeuwen, Sassenheim, Holland, for Pæonies.

To Messrs. Waterer, Sons & Crisp, Twyford, for *Iris Kaempferi* and Spiræas.

Banksian Medal.

To Mr. W. E. B. Archer & Daughter, Ashford, for Roses.

To Messrs. Bentall, Havering, for Roses.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Clark, Dover, for herbaceous plants.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Gibson & Amos, Cranleigh, for Dianthus.

To Mr. S. J. Goodliffe, Bishop's Stortford, for Delphiniums.

To Mr. Gavin Jones, Letchworth, for herbaceous plants.

To Messrs. Stewart, Wimborne, for Gladioli and Irises.

Award of Merit.

To Carnation ' Dairy Maid ' for market and cutting (votes unanimous), from Messrs. Allwood, Haywards Heath. A fancy perpetual flowering variety of good form and colour. The ground colour is white flaked with bright pink.

To Delphinium ' Doreen Margaret Robinson ' for exhibition (votes unanimous), from Mr. H. Robinson, Hinckley. Flowers large, double, light blue with white eye, borne on a good bold spike.

To Delphinium ' Eve ' for exhibition (votes 11 for), from Mr. T. Carlile, Twyford. Flowers large, double, pale sky-blue and very pale mauve with white eye, spike large and of good shape.

To Delphinium ' F. S. Clay ' for exhibition (votes unanimous), from Mr. H. Robinson, Hinckley. Flowers large, double, mauve tinged with pale blue, eye dark, spike large and symmetrical.

To Delphinium *Belladonna* ' Isis ' for cutting (votes unanimous), from Mr. T. Bones, Cheshunt. Flowers single, rich deep blue shaded with mauve, spike compact.

Selected for trial at Wisley.

Delphinium Belladonna ' Isis,' from Mr. T. Bones, Cheshunt.

Other Exhibits.

Messrs. Bunyard, Maidstone : Roses.

Messrs. Dobbie, Edinburgh : Calceolaria ' Advance.'

Messrs. Hayward, Clacton : Dianthus.

Misses Hopkins, Coulsdon : herbaceous plants.

Messrs. Hughes, Sutton Green : Campanula ' Telham Beauty.'

Messrs. Mackender, Trent : Pelargonium ' Carmine Glory.'

Mr. A. J. Mayes, Wellingborough : Delphinium ' Elizabeth Mayes.'

Mr. A. Miles, Bickley : herbaceous plants.

Mrs. K. R. Pattullo, Dundee : Pyrethrum ' Newbigging.'

Mr. W. Spencer, Milford : Delphinium seedling.

Mr. J. E. H. Stooke, Hereford : *Scabiosa caucasica* ' Danesmere.'

Mr. G. E. P. Wood, Ashted : herbaceous plants.

July 19, 1932, Mrs. LINDSAY SMITH in the Chair, and fifteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Dobbie, Edinburgh, for Annuals and Biennials.

Silver-gilt Banksian Medal.

To Messrs. Bolton, Halstead, for Sweet Peas.

To Messrs. Prichard, Christchurch, for herbaceous plants.

Silver Banksian Medal.

To Messrs. Bentall, Havering, for Roses.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. F. Cant, Colchester, for Roses.

To Messrs. Chaplin, Waltham Cross, for Roses.

To Messrs. Dobbie, Edinburgh, for Pansies.

To Messrs. Dobbie, Edinburgh, for Roses.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Mr. S. J. Goodliffe, Bishop's Stortford, for herbaceous plants.

To Messrs. Hillier, Winchester, for herbaceous plants and shrubs.

To Mr. Gavin Jones, Letchworth, for herbaceous plants.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Messrs. Prior, Colchester, for Roses.

To Messrs. Russell, Richmond, for Begonias.

To Suffolk Seed Stores, Woodbridge, for herbaceous plants.

To Messrs. Waterer, Sons & Crisp, Twyford, for *Iris Kaempferi*, *Astilbes*, *Nymphæas*.

Banksian Medal.

To Mr. W. E. B. Archer & Daughter, Ashford, for Roses.

To Messrs. Clark, Dover, for herbaceous plants.

To Messrs. John Forbes, Hawick, for Phloxes, Delphiniums, etc.

To Messrs. Ladhams, Southampton, for herbaceous plants.

To Messrs. Reuthe, Keston, for herbaceous plants.

To Messrs. Sutton, Reading, for Antirrhinums.

Award of Merit.

To Carnation 'Goliath' for cutting (votes 11 for, 4 against), from Messrs. Allwood, Haywards Heath. A bright orange 'Border' variety flaked with carmine. It is a very full flower of good form.

To Delphinium 'Eileen May Robinson' for exhibition (votes 13 for, 2 against), from Mr. H. Robinson, Hinckley. A pale lavender-mauve variety lightly marked with sky-blue on the outer segments and having a primrose eye. The flowers are carried on a fine bold spike.

To Delphinium 'Venus' for exhibition (votes unanimous), from Mr. H. Robinson, Hinckley. This variety produces very fine spikes of large bright blue flowers shaded mauve with a conspicuous dark eye.

To Nymphaea 'Fire Crest' as a hardy water plant (votes 8 for, 2 against), from Lionel de Rothschild, Esq. (gr. Mr. A. Bedford), Exbury. A very beautiful pale pink Water Lily with golden stamens tipped red and pointed petals.

Selected for trial at Wisley.

Alstroemeria aurantiaca 'Dover Orange,' from Messrs. Clark, Dover.

Godetia 'Sybil Sherwood,' from Messrs. Hurst, Houndsditch.

Hardy Border Pink 'A. E. Amos,' from Messrs. Gibson & Amos, Cranleigh.

Hardy Border Pink 'Hilda,' from Messrs. Gibson & Amos, Cranleigh.

Other Exhibits.

Mr. R. Browning, Chartham : Rose 'Syringa.'

Messrs. Hemsley, Crawley : herbaceous plants.

Misses Hopkins, Coulsdon : herbaceous plants.

Messrs. Hughes, Sutton Green : herbaceous plants.

Mr. H. Marcham, Carshalton : varieties of *Chrysanthemum maximum*.

Mr. A. Miles, Bickley : herbaceous plants.

Mr. W. M. Nelson, Coatbridge : Viola 'Mrs. Jean Martyn.'

Messrs. Reeves, Norwich : Roses.

August 9, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and sixteen other members present.

*Awards Recommended :—**Silver-gilt Banksian Medal.*

To Messrs. H. J. Jones, Lewisham, for Phloxes.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Baker, Codsall, for Astilbes.

To Messrs. Bentall, Havering, for Roses.

To Messrs. Blackmore & Langdon, Bath, for Phloxes.

To Messrs. Bolton, Halstead, for Sweet Peas.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Dobbie, Edinburgh, for Annuals and Violas.

To Donard Nursery Co., Newcastle, Co. Down, for Dieramas.

To Messrs. Hillier, Winchester, for herbaceous plants and shrubs.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Napsbury Mental Hospital (gr. Mr. W. J. Jennings), St. Albans, for Celosias.

To Messrs. Wakeley, London, for Gladioli and Lilies.

Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Gibson & Amos, Cranleigh, for Gladioli.

To Messrs. Hemsley, Crawley, for Sidalceas.

To Messrs. Ladhams, Southampton, for herbaceous plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. Reeves, Norwich, for Roses.

To Messrs. Reuthe, Keston, for herbaceous plants.

Award of Merit.

To Gladiolus 'Mme. Mounet Sully' for exhibition (votes unanimous), from Messrs. Gibson & Amos, Cranleigh. A large-flowered creamy-white variety with dark red blotches at the base of the lower segments. The flowers are closely set on a good, erect spike.

To Montbretia 'Lady Gwen' for exhibition (votes 12 for), from Mr. E. J. Hollingworth, Westerham. This variety was raised by Mr. A. E. Hill, of Westerham, as the result of a cross between 'His Majesty' and 'Indian Chief.' The scarlet flowers are of medium size and have an orange-yellow throat.

Selected for trial at Wisley.

Carnation 'Mrs. F. Bright' from Mr. F. Bright, Shinfield.

Dianthus deltoides 'Erect,' from Messrs. Allwood, Haywards Heath.

Gladiolus 'Golden Copper,' from Major G. Churcher, Lindfield.

The following awards were made after trial at Wisley :

Award of Merit.

To Godetia 'Sybil Sherwood' from Messrs. Hurst, Houndsditch. Raised by the senders. Plant 15 inches; flowers 2-2½ inches diameter, white with broad bands of soft salmon-pink. A very true and even stock.

To *Lythrum salicaria* 'The Beacon' from Mr. W. A. Collier, Redbourn. This plant was raised by the sender and has the characters of the type, but flowers of a rich rosy-red shade.

The awards recommended to Gladiolus and Stocks on trial at Wisley were confirmed.

Other Exhibits.

Major L. H. Brammall, Bickley : herbaceous plants.

Messrs. Clark, Dover : herbaceous plants.

Messrs. Hayward, Clacton : Pinks and herbaceous plants.

Messrs. Hughes, Sutton Green : Scabious, etc.

Messrs. Sander, St. Albans : *Anthurium Andreanum* 'Blush Queen.'

Mr. A. Solomons, Dalston : seedling Gladiolus.

Mr. G. E. P. Wood, Ashted : Violas, etc.

August 23, 1932, Mr. J. M. BRIDGEFORD in the Chair, and twelve other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. E. Ladhams, Elstead, for herbaceous plants and Nymphæas.

To Messrs. Wakeley, London, for Gladioli.

Silver Banksian Medal.

To Messrs. Bentall, Havering, for Roses.

To Messrs. Chaplin, Waltham Cross, for Roses and Delphiniums.

To Mr. S. J. Goodliffe, Bishop's Stortford, for herbaceous plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Ladhams, Southampton, for Lobelias, etc.

To Messrs. Letts, Hadleigh, for Roses.

To Messrs. Reuthe, Keston, for herbaceous plants.

To Messrs. Stredwick, St. Leonards-on-Sea, for Dahlias.

To Mr. C. Turner, Slough, for Dahlias.

Award of Merit.

To *Chrysanthemum* 'Arctic Circle' for cutting and market (votes 8 for, 4 against), from Mr. T. Johnson, Tibshelf. A good white, incurved variety of perfect shape. It is a seedling raised by the exhibitor and its height is given as 3 feet.

Selected for trial at Wisley.

Physostegia speciosa rosea

Physostegia virginiana altissima

Physostegia virginiana rosea

} from Messrs. Hayward, Clacton.

The following award was made after trial at Wisley :

Award of Merit.

To *Nasturtium* 'Golden Gleam' sent by Messrs. Dobbie, Edinburgh. Raised by Messrs. Bodger ; of semi-trailing habit ; foliage bright green ; flowers large, semi-double, bright golden-yellow, sweetly scented.

The awards recommended to Annual *Dianthus* after trial at Wisley were confirmed.

Other Exhibits.

Mr. W. Baker, Esq., Williton : Border Carnation 'Princess Margaret Rose.'

Messrs. Clark, Dover : herbaceous plants.

W. Geddes, Esq., Rumbling Bridge : *Sidalcea* 'Minnie Geddes.'

Messrs. Hemsley, Crawley : herbaceous plants and *Heliotrope*.

Misses Hopkins, Coulsdon : herbaceous plants.

Messrs. Ladhams, Southampton : *Lobelias*.

Messrs. Reeves, Norwich : *Roses*.

Messrs. Redgrove & Patrick, Sevenoaks : *Roses*.

Mr. H. Shoesmith, jun., Woking : *Chrysanthemums* 'Hussar' and 'Model.'

* * *

Section B.

January 12, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—*Banksian Medal.*

To Messrs. Barr, Taplow, for bulbous plants.

To Messrs. Cheal, Crawley, for shrubs and hardy plants.

To Mr. Hemsley, Crawley, for shrubs and hardy plants.

To Messrs. Russell, Richmond, for shrubs.

To Messrs. Waterer, Bagshot, for shrubs and hardy plants.

Award of Merit.

To *Hamamelis mollis* var. *pallida* as a hardy flowering shrub (votes unanimous), from the Director, R.H.S. Gardens, Wisley.

Hamamelis mollis received the Society's F.C.C. in 1918, and is now well known and prized for its early, fragrant flowers. The present variety is of more erect habit than the type and perhaps of more rapid growth. The petals are somewhat longer and more spreading ; their colour, like that of the sepals, a little paler.

Other Exhibits.

Mr. C. Engelmann, Saffron Walden : *Echeveria retusa hybrida*.

Sir Wm. Lawrence, Bt., Burford : *Watsonia* × 'Brisbane.'

C. T. Musgrave, Esq., Godalming : *Colchicum montanum*.

January 26, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—*Silver Banksian Medal.*

To Mr. H. Hemsley, Crawley, for shrubs.

To Messrs. Russell, Richmond, for shrubs.

Banksian Medal.

To Messrs. Barr, Taplow, for bulbous plants.

To Messrs. Cheal, Crawley, for shrubs and rock plants.

To the Rev. Rollo Meyer, Hertford, for bulbous *Iris*es.

To Messrs. Waterer, Twyford, for shrubs and rock plants.

To Messrs. Wm. Wood, Taplow, for shrubs and rock plants.

Award of Merit.

To *Crocus* × 'Blue Jay' as a hardy flowering plant (votes 11 for, 1 against), from E. A. Bowles, Esq., Waltham Cross. *Crocus chrysanthus* is very variable in colour and crosses easily with *C. biflorus* var. *Weidenii*. 'Blue Jay' is a

seedling from this cross. The inside of the perianth is light bluish-purple in colour, the outer segments deep violet externally, marked with blue at the base.

To *Crocus* × 'Copenhagen China' as a hardy flowering plant (votes 13 for), from E. A. Bowles, Esq. This is a sister seedling of the preceding variety. A flower of elegant form and delicate colouring. It is of palest lavender, tinged with sulphur in the throat. The blue colour of the tube extends upward into feathered blotches of purplish-blue on the outside of the flower.

To *Crocus Tomasinianus* var. *roseus* as a hardy flowering plant (votes unanimous), from E. A. Bowles, Esq. A very charming pink *Crocus*. The internal colour is deep rosy-lilac, flushed with lavender at the base. Externally the inner segments are purplish-rose, the outer buff, suffused with rose.

Cultural Commendation.

To Mr. Albert Saville, gardener to Sir George Mannors, Woodbridge, for a flowering shoot of *Protea cynaroides*.

Other Exhibits.

E. A. Bowles, Esq., Waltham Cross : *Crocus Tomasinianus* var. *ruber*.

Sir Wm. Lawrence, Bt., Burford : *Heterocentron roseum*.

Mr. P. S. Patrick, Sevenoaks : shrubs.

Messrs. Stewart, Ferndown : shrubs and rock plants.

Mr. G. G. Whitelegg, Chislehurst : shrubs and rock plants.

Worth Park Nurseries, Three Bridges : shrubs.

February 9, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Cutbush, Barnet, for shrubs.

Banksian Medal.

To Messrs. Barr, Taplow, for bulbous plants.

To Brookside Nurseries, Oxford, for alpine plants.

To Messrs. Cheal, Crawley, for shrubs and alpine plants.

To Messrs. Hillier, Winchester, for shrubs.

To Hocker Edge Gardens, Cranbrook, for alpine plants.

To the Rev. Rollo Meyer, Hertford, for bulbous *Iris*es.

To Messrs. Russell, Richmond, for shrubs.

To Messrs. Waterer, Twyford, for alpine plants and shrubs.

Award of Merit.

To *Crocus Balansae* as a hardy flowering plant for rock garden and alpine house (votes 9 for), from Mrs. W. R. Dykes, Woking. A very desirable free-flowering species from western Asia Minor. The small flowers are apricot-yellow within and variously marked with purplish-brown externally. In the form exhibited, the whole of the outside of the outer segments was of a rich mahogany brown.

Other Exhibits.

Major L. H. Brammall, Bickley : alpine plants.

Mr. H. Hemsley, Crawley : shrubs and alpine plants.

Lye Green Nurseries, Chesham : shrubs.

Mr. P. S. Patrick, Sevenoaks : shrubs and alpine plants.

F. C. Stern, Esq., Goring-by-Sea : *Galanthus Imperati* var. *Atkinsii*, *G. nivalis* var. *lutescens*.

Mr. W. Wells, Merstham : alpine plants.

Messrs. Wm. Wood, Taplow : shrubs and alpine plants.

February 23, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Russell, Richmond, for forced shrubs and greenhouse plants.

Silver Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs and alpine plants.

Banksian Medal.

To Messrs. Barr, Covent Garden, for bulbous plants.

To Messrs. Cutbush, Barnet, for shrubs and bulbous plants.

To Messrs. Stewart, Ferndown, for alpine plants and shrubs.

To Messrs. Veitch, Exeter, for *Magnolias* and *Camellias*.

To Mr. G. E. Welch, Cambridge, for alpine plants.

Award of Merit.

To *Prunus dehiscens* as a hardy flowering shrub (votes unanimous), from F. C. Stern, Esq., Goring-by-Sea. A species of the sub-genus *Amygdalus*, discovered by Wilson in Szechwan. It forms a densely branched shrub 6 to 10 feet high. The pale pink flowers are produced before the leaves singly or in two-flowered clusters on the rigid, spine-tipped branchlets, which are greenish-grey in colour. The shortly-stalked leaves are about an inch long, oblong or oblanceolate, dark green above and somewhat paler beneath.

Other Exhibits.

Brookside Nurseries, Oxford : alpine plants.
 Messrs. Carter Page, London Wall : alpine plants.
 Messrs. Casburn, Bedford & Page, Trumpington : alpine plants.
 Mr. H. Hemsley, Crawley : shrubs and alpine plants.
 Messrs. Hillier, Winchester : flowering shrubs.
 Hocker Edge Gardens, Cranbrook : alpine plants.
 Messrs. Maxwell & Beale, Broadstone : shrubs and alpine plants.
 The Rev. Rollo Meyer, Hertford : bulbous Irises.
 Mr. P. S. Patrick, Sevenoaks : shrubs and alpine plants.
 Messrs. Prichard, Christchurch : alpine plants and shrubs.
 Mr. G. Reuthe, Keston : shrubs and hardy plants.
 Messrs. Waterer, Twyford : shrubs and alpine plants.
 Messrs. Wm. Wood, Taplow : shrubs and alpine plants.

March 8, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—*Silver Banksian Medal.*

To Messrs. Elliott, Stevenage, for alpine plants.
 To Messrs. Russell, Richmond, for Azaleas and other shrubs.

Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs and alpine plants.
 To Mr. H. Hemsley, Crawley, for conifers and other shrubs.
 To Messrs. Hillier, Winchester, for shrubs.
 To the Hocker Edge Gardens, Cranbrook, for alpine plants.
 To Messrs. Prichard, Christchurch, for shrubs and alpine plants.
 To Mr. G. Reuthe, Keston, for shrubs.
 To Messrs. Wallace, Tunbridge Wells, for shrubs and alpine plants.
 To Messrs. Waterer, Bagshot, for alpine and bulbous plants.
 To Messrs. Waterer, Bagshot, for shrubs.
 To Mr. G. E. Welch, Cambridge, for alpine plants.

Preliminary Commendation.

To *Iris Winogradowii* as a hardy flowering plant (votes unanimous), from Messrs. R. Wallace, Tunbridge Wells. This species is a notable addition to the list of early-flowering bulbous Irises. It is of recent introduction from the western central district of Georgia, Transcaucasia, and in habit resembles the better-known *I. histrioides*. The flowers, which appear before the long, narrow leaves, are less than 6 inches in height, of a uniform soft yellow, the falls marked with a central line of orange and variously spotted with darker colour. The species is figured at t. 9220 of the Botanical Magazine.

Other Exhibits.

Major L. H. Brammall, Bickley : alpine plants.
 Messrs. Casburn, Bedford & Page, Trumpington : alpine plants.
 Mrs. Headlam, Everslot : *Galanthus nivalis* var. 'Lady Elphinstone.'
 Messrs. Hughes, Sutton Green : conifers and other shrubs.
 Lye Green Nurseries, Chesham : Ericas and alpine plants.
 Messrs. Maxwell & Beale, Broadstone : shrubs and alpine plants.
 Messrs. Neale, Newhaven : succulents.
 F. C. Stern, Esq., Goring-by-Sea : *Anemone blanda* var. *Ingramii*.
 Messrs. Stewart, Ferndown : shrubs and alpine plants.
 Admiral Heneage Vivian, Swansea : *Rhododendron eximium* × *Falconeri*.

March 22, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Messrs. Elliott, Stevenage, for alpine plants.

Banksian Medal.

To Brookside Nurseries, Oxford, for alpine plants.
 To Messrs. Casburn, Bedford & Page, Cambridge, for alpine plants.

To Messrs. Cheal, Crawley, for shrubs.
 To Messrs. Cuthbert, Southgate, for shrubs.
 To Messrs. Hillier, Winchester, for shrubs.
 To Messrs. Prichard, Christchurch, for alpine plants and shrubs.
 To Messrs. Reuthe, Keston, for shrubs.
 To Messrs. Stewart, Ferndown, for shrubs, alpine plants and Narcissi.
 To Messrs. Waterer, Twyford, for alpine plants and shrubs.
 To Mr. G. E. Welch, Cambridge, for alpine plants.
 To Messrs. Wood, Taplow, for alpine plants.

Cultural Commendation.

To Messrs. Casburn, Bedford & Page, Cambridge, for a pan of *Saxifraga Jenkinsiae*.

Other Exhibits.

Messrs. Baker, Codsall : shrubs and alpine plants.
 Major L. H. Brammall, Bickley : shrubs and alpine plants.
 Messrs. W. & J. Brown, Peterborough : *Iris reticulata*.
 Messrs. Burkwood & Skipwith, Kingston-on-Thames : *Viburnum* × *Burkwoodii*.

Messrs. Cheal, Crawley : alpine plants.

Messrs. Clark, Dover : alpine plants and shrubs.

Dame Alice Godman, Horsham : *Dimorphotheca Ecklonis*, *Lachenalia* sp., *Crassula alpestris*.

Dr. P. L. Giuseppi, Felixstowe : *Fritillaria pluriflora*, *Narcissus scaberulus*.

Hocker Edge Gardens, Cranbrook : alpine plants.

Messrs. Hollamby, Groombridge : *Osmanthus Delavayi*.

Messrs. Hughes, Sutton Green : alpine plants.

Messrs. Lock, Yeovil : shrubs and alpine plants.

Mr. A. Kench, Weybridge : alpine plants.

The Director, Royal Botanic Gardens, Kew : *Pomaderris elliptica*.

Dr. N. W. Jenkin, Hindhead : *Saxifraga* 'Hindhead Seedling.'

Marsden Nurseries, Ashted : shrubs and alpine plants.

Messrs. Maxwell & Beale, Broadstone : shrubs and alpine plants.

Messrs. Redgrove, Borough Green : shrubs and alpine plants.

Messrs. Robinson, Eltham : shrubs and alpine plants.

Messrs. Rogers, Southampton : alpine plants and shrubs.

P. Rosenheim, Esq., Molesey : *Primula* × *Berninae*.

Messrs. Russell, Richmond : shrubs.

Mrs. E. M. Wightman, Hertford : *Ophrys tenthredinifera*.

April 5, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. Waterer, Bagshot, for flowering shrubs.

Silver Banksian Medal.

To Messrs. Elliott, Stevenage, for alpine plants.

To Messrs. Garways, London, W.C. 1, for succulent plants.

To Messrs. Russell, Richmond, for stove plants and shrubs.

To Messrs. Prichard, Christchurch, for alpine plants and shrubs.

Banksian Medal.

To Messrs. Neale, Newhaven, for succulent plants.

To Messrs. Haskins, Bournemouth, for flowering shrubs.

To Messrs. Cheal, Crawley, for alpine plants and shrubs.

To Mr. T. M. Endean, Laindon, for succulent plants.

Award of Merit.

To *Primula stenocalyx* as a flowering plant for rock garden or alpine house (votes unanimous), from Roger Bevan, Esq., Henley-on-Thames. A pretty and easily-grown member of the section *Farinosae*. It forms a flattish rosette of grey-green, serrate leaves, and the flowers are produced in flat-headed umbels on stalks 4 to 5 inches high. The colour of the corolla is a light rosy-mauve. A peculiarity of the species is the production of slender, axillary rhizomes, which provide a ready means of propagation.

Preliminary Commendation.

To *Primula rotundifolia* (votes 10 for), from Mrs. H. Milford, Chedworth. A member of the difficult section bearing its name, of which only two members, *P. Baileyana* and *P. cardiophylla*, have previously been in cultivation.

Other Exhibits.

Messrs. Baker, Codsall : shrubs and alpine plants.

Messrs. Barr, Covent Garden : alpine plants and shrubs.

A. Bryans, Esq., Holmwood : alpine plants.
 Col. S. R. Clarke, Haywards Heath : *Primula villosa commutata*.
 Marquess of Headfort, Kells : *Primula gracilentia*.
 Messrs. Hughes, Sutton Green : alpine plants and shrubs.
 Collingwood Ingram, Esq., Benenden : *Prunus pubigera* var. *Prattii*.
 Marsden Nurseries, Ashted : alpine plants and shrubs.
 Messrs. Marrett & Lawrence, Chelmsford : *Primula hirsuta* var. *nivalis*.
 Messrs. Maxwell & Beale, Broadstone : alpine plants and shrubs.
 Messrs. Redgrove & Patrick, Sevenoaks : shrubs and alpine plants.
 Messrs. Robinson, Eltham : alpine plants and shrubs.
 Messrs. Rogers, Southampton : alpine plants and shrubs.

April 26, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Elliott, Stevenage, for alpine plants in pans.
 To Messrs. Prichard, Christchurch, for alpine plants and shrubs.

Banksian Medal.

To Dartington Hall Gardens, Totnes, for alpine plants and shrubs.
 To Messrs. Hillier, Winchester, for shrubs.
 To Hocker Edge Gardens, Cranbrook, for alpine plants.
 To Messrs. Neale, Newhaven, for succulents.
 To Mr. G. Reuthe, Keston, for shrubs and hardy plants.
 To Messrs. Rogers, Southampton, for shrubs and alpine plants.
 To Messrs. Russell, Richmond, for stove plants and shrubs.
 To Messrs. Waterer, Twyford, for shrubs and alpine plants.
 To Mr. G. E. Welch, Cambridge, for shrubs and alpine plants.

Award of Merit.

To *Androsace hirtella* as a flowering plant for the alpine house (votes 10 for), from Frank Barker, Esq., Stevenage. A pretty species from the Pyrenees. It forms a rounded cushion of small, bright green leaves, from which rise the starry, white flowers.

To *Nolana lanceolata* as a half-hardy flowering plant (votes 9 for, 1 against), from Messrs. Watkins & Simpson, Drury Lane, London. This Chilean species was introduced some seventy years ago, and is figured in the Botanical Magazine at t. 5327. It is a plant of somewhat lax habit, bearing its pale green, lanceolate leaves in pairs. The widely campanulate flowers are bright blue, with a yellow-tinged white throat.

To *Nomocharis Mairei* as a hardy flowering plant (votes 10 for), from the Director, R.H.S. Gardens, Wisley. A representative of an Eastern genus closely allied to *Lilium* and *Fritillaria*. It is an elegant plant, bearing a leafy stem surmounted by a few-flowered raceme. The three outer segments of the flower, which is saucer-shaped, resemble those of a small Lily; the inner ones are broader and delicately fringed, white or of palest pink and attractively spotted with chocolate.

To *Paraquilegia grandiflora* as a flowering plant for the rock garden or alpine house (votes unanimous), from G. P. Baker, Esq., Sevenoaks. A dainty plant producing a number of delicate, white, pink-flushed flowers like single Anemones from the midst of a cluster of finely-divided, grey-green leaves, recalling those of *Corydalis*. Formerly known as *Isopyrum grandiflorum*, and figured under this name in the Society's JOURNAL, vol. 42, fig. 15.

To *Phlox adsurgens* as a flowering plant for the rock garden or alpine house (votes unanimous), from Dr. P. L. Giuseppi, Felixstowe. A small, prostrate species. The dark green leaves are opposite and sessile. The pale rose-coloured flowers are produced in flattish clusters at the tips of the trailing growths.

To *Primula × rhenaniana* as a flowering plant for the rock garden or alpine house (votes 15 for), from the Director, R.H.S. Gardens, Wisley. This is probably a hybrid of *P. marginala*. The lanceolate leaves are coarsely serrate and somewhat farinose. The flowers are mauve with a white eye, borne in umbels on erect peduncles.

To *Vaccinium Nummularia* as a hardy flowering shrub (votes unanimous), from Mr. A. Kench, Weybridge. A dwarf, evergreen species from the Himalaya. Leaves dark green, coriaceous. Flowers in drooping, axillary racemes, white, pink-tinted.

Preliminary Commendation.

To *Primula Wollastonii* (votes unanimous), from T. Hay, Esq., Hyde Park. A rare Soldanelloid species, collected in Nepal at an altitude of 1700 feet. The

light green, hairy leaves form a small rosette from which rise the 6-inch stalks, each of which bears several pendent, campanulate flowers of deep, purplish blue.

Cultural Commendation.

To Mr. J. Wall, Superintendent of the Rock Garden, Wisley, for a plant of *Lithospermum oleaeifolium*.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant : *Primula* sp.

G. P. Baker, Esq., Sevenoaks : *Sedum fastigiatum*, *Primula* 'Hillside,'

Gentiana acaulis alba, *Gentiana verna*, *Daphne Cneorum alba*.

Messrs. Baker, Codsall : shrubs and alpine plants.

Messrs. Barr, Covent Garden : alpine plants and shrubs.

Messrs. Casburn, Bedford & Page, Cambridge : alpine plants.

Messrs. Cheal, Crawley : shrubs and alpine plants.

Mr. G. H. Dalrymple, Bartley : *Primulas*.

Mrs. W. R. Dykes, Woking : *Ceanothus rigidus*.

Messrs. Elliott, Stevenage : *Viola dumetorum*.

Mr. P. Gardner, Addingham : alpine plants.

Mr. A. Hansen, New Barnet : alpine plants.

Collingwood Ingram, Esq., Benenden : *Prunus mutabilis*, *P. tenuiflora*.

Mr. C. A. Jardine, Feltham : *Primula Auricula alpina*.

Mr. A. Kench, Weybridge : alpine plants.

Sir Wm. Lawrence, Bt., Burford : *Salix hypoleuca*, *Orithrosanthus chimboracensis*, *Berberis Aquifolium* var. *fascicularis*.

Lady Leconfield, Petworth : *Diplotaxis glutinosus*.

Lye Green Nurseries, Chesham : shrubs and alpine plants.

Marsden Nurseries, Ashted : alpine plants and shrubs.

E. M. Preston, Esq., Hayes : *Leschenaultia biloba major*, *Olearia Gunniana* var. *lilacina*.

Messrs. Redgrove & Patrick, Sevenoaks : shrubs and hardy plants.

Mr. J. Robinson, New Eltham : alpine plants.

May 10, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Elliott, Stevenage, for alpine plants in pans.

To Mr. R. C. Notcutt, Woodbridge, for flowering shrubs.

Banksian Medal.

To Messrs. Barr, Covent Garden, for hardy plants.

To Messrs. Cheal, Crawley, for shrubs and rock plants.

To Messrs. Maxwell & Beale, Broadstone, for rock plants.

To Messrs. Neale, Newhaven, for Gazanias and succulents.

To Messrs. Pennell, Lincoln, for Clematis and Statice.

To Messrs. Frichard, Christchurch, for shrubs and rock plants.

To Messrs. Rogers, Southampton, for alpine plants and shrubs.

To Messrs. Russell, Richmond, for flowering shrubs.

To Messrs. Waterer, Twyford, for rock plants and shrubs.

Award of Merit.

To *Aotus gracillima* as a greenhouse flowering shrub (votes unanimous), from Lionel de Rothschild, Esq., Exbury. A very pretty flowering shrub introduced from the Swan River nearly a century ago. It is a Leguminous plant, producing long and slender branches which in the flowering season become covered with small flowers of red and yellow.

To *Arum creticum* as a hardy flowering plant (votes unanimous), from Hiatt C. Baker, Esq., Almondsbury. This was collected in Crete by the exhibitor. The large, rich green leaves are hastate, with acute basal lobes. The inflorescences reach a height of 1 foot or more. The long, pale yellow spathe is somewhat undulate, and encloses a slender, orange-coloured spadix.

To *Cytisus hirsutus* var. *demissus* as a flowering shrub for the rock garden or alpine house (votes unanimous), from G. P. Baker, Esq., Sevenoaks. As shown, planted in a large pan, this entirely prostrate form of *C. hirsutus* is very suitable for the alpine house. The slender, villose branches are clothed with small, ternate leaves, from the axils of which spring large, bright yellow flowers with reddish, hairy calyces.

To *Gladiolus revolutus* as a tender flowering plant (votes unanimous), from Collingwood Ingram, Esq., Benenden. A slender plant about 18 inches high. The long, narrow leaves are strongly ridged ; the flowers, which are borne in a

few-flowered spike, are widely expanded and of a bright orange-red colour, except in the tube, which is paler and lined with yellow. This is the *Homo-glossum Huttonii* of N. E. Brown, and it is figured at t. 450 of the Botanical Magazine under the name *Gladiolus Watsonius*.

Other Exhibits.

Messrs. Adams, Tunbridge Wells : alpine plants.

R. Bevan, Esq., Henley-on-Thames : *Saxifraga diapensoides* var. *primulina*, *Campanula Saxifraga*.

Mrs. T. E. Boscawen, Stockbridge : *Lotus mascaensis*.

Selwyn Duruz, Esq., Wallington : *Sempervivum* "ornatum."

F. Graham, Esq., E. Horsley : *Phlox* sp.

Mr. A. Hansen, New Barnet : rock plants.

Messrs. Hemsley, Crawley : rock plants and shrubs.

Messrs. Hewitt, Solihull : Primulas and Meconopsis.

John Innes Hort. Inst., Merton : *Streptocarpus Holstii*.

Collingwood Ingram, Esq., Benenden : *Gladiolus revolutus* × *G. concolor*,

Prunus serrulata 'Tao-min.'

Mr A. Kench, Weybridge : alpine plants.

Sir Wm. Lawrence, Bt., Burford : *Oreocharis primuloides*.

Marsden Nurseries, Ashted : rock plants and shrubs.

Lt.-Col. L. C. R. Messel, Handcross : *Pimelia orthocephala*, *P. flava*.

Mrs. Milford, Chedworth : alpine plants.

Messrs. Redgrave & Patrick, Sevenoaks : rock plants and shrubs.

Major G. H. Tristram, Westerham : *Saxifraga maderensis*.

Miss E. Willmott, Great Warley : *Lilium Thomsonianum*.

May 24, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-five other members present.

Awards Recommended :—

First-class Certificate.

To *Haberlea Ferdinandi-Coburgi* as a flowering plant for the rock garden or alpine house (votes 10 for, 5 against), from G. P. Baker, Esq., Sevenoaks. A species well known and deservedly popular among rock-garden enthusiasts. It received the Award of Merit on May 23, 1911, and is described and figured in the JOURNAL, vol. 37, p. cxxxi.

To *Magnolia Wilsonii* as a hardy flowering shrub (votes 11 for, 3 against), from G. W. E. Loder, Esq., Ardingly. This species was exhibited by Mr. Loder on August 11, 1931, when an Award of Merit was recommended subject to verification of the name. It forms a small tree of vigorous and rapid growth. The leaves are large, ovate with acuminate tips, dark green above and pale with a fine white tomentum beneath. The young shoots and flower-buds are covered with short, reddish hairs. The remarkable blossoms are pendulous and semi-double, opening nearly flat. The petals are white, with rays of purplish-rose running out along the inner segments. The central mass of stamens is dark red.

Award of Merit.

To *Berberis chillanensis* as a hardy flowering shrub (votes 15 for, 2 against), from Lt.-Col. L. C. R. Messel, O.B.E., Handcross. Shown as *B. montana*, under which name it received Preliminary Commendation on May 19, 1931. A Chilean species (Comber 798) bearing clusters of small, pale green, toothed leaves and solitary yellow flowers on long, pendulous stalks.

To *Embothrium lanceolatum* as a hardy flowering shrub (votes unanimous), from G. W. E. Loder, Esq., Ardingly. A very handsome species of this South American genus of Proteaceae. It differs from the better-known *E. coccineum* in its narrower, acute leaves and in the more uniform scarlet colour of its flowers. The flower-clusters, which in *E. coccineum* are mainly terminal, are freely produced on short, lateral growths.

To *Gemista januensis* as a hardy flowering plant for the rock garden or alpine house (votes unanimous), from G. P. Baker, Esq., Sevenoaks. A small, procumbent shrub with long, slender branches and short, ascending lateral twigs bearing entire, lanceolate, grey-green leaves and terminal clusters of bright yellow flowers.

To *Grevillea rosmarinifolia* as a hardy flowering shrub (votes 19 for, 1 against), from G. W. E. Loder, Esq., Ardingly. A shrub of vigorous and rapid growth suitable for the warmer parts of the country. The specific name gives an indication of the character of the foliage; the quaint tubular flowers are rosy-red and are freely borne on lateral branchlets.

Mrs. H. Thompson, Weybridge : *Hippeastrum* hybrid.
 Sir Oscar Warburg, Epsom : *Cistus parviflorus*.
 Miss E. Willmott, Great Warley : *Cotoneaster rhamnoides*.
 A. Worsley, Esq., Isleworth : *Aucuba japonica* vars.
 Rev. T. G. Wyatt, Horley : *Cytisus* seedlings.

June 21, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—

Silver Lindley Medal.

To Messrs. Sutton, Reading, for *Pentstemon glaber*.

Lindley Medal.

To Messrs. Gill, Falmouth, for *Rhododendron Griersonianum*.

Banksian Medal.

To Mr. W. A. Constable, Paddock Wood, for Liliiums.

To Messrs. Hillier, Winchester, for *Rosa* species and other shrubs.

To Messrs. Maxwell & Beale, Broadstone, for alpine plants.

To Messrs. Rogers, Southampton, for alpine plants.

Award of Merit.

To *Campanula Hawkinsiana* as a hardy flowering plant for rock garden or alpine house (votes unanimous), from Roger Bevan, Esq., Henley-on-Thames. A species from the north of Greece. It forms a tuft of small, glabrous, rather fleshy leaves. The slender, wiry, almost leafless stems rise to a height of about 1 foot, each bearing a large, widely-expanded purple flower.

To *Deutzia* 'Snowdrift' as a hardy flowering shrub (votes unanimous), from Lady Leconfield, Petworth Park. This appears to be a fine, vigorous form of the double variety of *D. scabra*, often known in gardens as *D. crenata*. The flowers are borne in long, narrow panicles.

To *Eremurus* 'Flair' as a hardy flowering plant (votes unanimous), from Major F. C. Stern, Goring-by-Sea. The parentage of this beautiful hybrid was stated to be *E. Bungei* × *E. Elwesianus*. The massive flowering stems reach a height of nearly 8 feet, the upper part being densely clothed with innumerable starry flowers. The colour is a bright golden-yellow, shaded with warm pink, which predominates in the unopened flowers.

To *Lilium amabile* as a hardy flowering plant (votes 12 for), from Lt.-Col. L. C. R. Messel, O.B.E., Handcross. This Korean Lily is not an easy plant to establish in cultivation and is, consequently, uncommon. It is a slender plant 1 to 3 feet high, the upper half of the stem clothed with narrow, spreading, dull green leaves. The flowers are carried singly or in a few-flowered raceme; the perianth segments are strongly reflexed, grenadine-red with black spots. Anthers chocolate, on short filaments.

To *Lilium monadelphum* as a hardy flowering plant (votes unanimous), from Messrs. Wallace, Tunbridge Wells. A handsome and easily-grown Lily reaching a height of 6 feet or more when established. The numerous rich green leaves are scattered and spreading. The flowers, numbering twenty or even more, are borne in a close terminal raceme. The perianth is 5 inches in diameter, segments reflexed, waxy, golden-yellow more or less spotted purple. The flower has an unpleasantly strong odour. It differs from *L. Szovitsianum* in its paler, shorter bulb with closer, narrower scales, in the flower-buds being exposed earlier, in the golden not orange pollen, and in the shorter, more flaccid foliage, which is of a greyer tint.

To *Lilium* × *phildauricum* as a hardy flowering plant (votes 7 for), from Lt.-Col. G. S. F. Napier, Horeham Road, E. Sussex. This is stated to be a hybrid between *L. philadelphicum* and *L. dauricum*, and makes a plant about 2 feet high with abundant, narrow foliage. The erect, orange-red flowers are spotted with crimson and are carried in a terminal umbel, thus resembling some of the well-known forms of *L. umbellatum*.

To *Lilium* × *Scottiae* as a hardy flowering plant (votes unanimous), from Lt.-Col. G. S. F. Napier, Horeham Road, E. Sussex. The parentage of this hybrid is given as *L. Willmottiae* × *L. umbellatum*. From this cross, which was made in America, several distinct plants were raised. The one exhibited was sturdy and erect, bearing glossy green leaves and horizontal, orange-red, spotted flowers of solid texture.

To *Lysimachia Leschenaultii* as a half-hardy flowering plant (votes unanimous), from T. Hay, Esq., Hyde Park. This Indian species is a herbaceous perennial of branching habit. The leaves are lanceolate and acuminate, opposite or in whorls of three. The somewhat dense, terminal racemes bear numerous flowers of a pleasing shade of blue-purple.

To *Stewartia serrata* as a hardy flowering shrub (votes unanimous), from Col. Stephenson R. Clarke, C.B., Haywards Heath. A beautiful Japanese species forming a large shrub or small tree. The deciduous leaves are 2 to 3 inches long, ovate or elliptic, serrate, dark green and glabrous above, hairy beneath. The solitary, cup-shaped flowers are over 2 inches in diameter, with leafy sepals and five creamy-white, serrated petals flushed with rose externally and enclosing a central mass of golden stamens.

To *Zenobia speciosa* var. *pulverulenta* as a hardy flowering shrub (votes unanimous), from the Knap Hill Nurseries, Woking. Of the one species of *Zenobia*, two forms occur together in eastern N. America. One of these, the present plant, has strikingly glaucous foliage, while in the other (see below) the leaves are green. The snowy flowers, recalling those of Lily-of-the-Valley, are borne in axillary clusters forming racemes on the upper part of the previous season's branchlets. A handsome shrub, up to 6 feet in height, with gracefully arching shoots.

Other Exhibits.

Mr. J. C. Allgrove, Slough : *Rosa Moyesii*.

Messrs. Baker, Codsall : *Deutzia* 'Mont Rose,' *Syringa Vilmoriniana*.

Major L. H. Brammall, Bickley : rock plants.

Dean Gardens, East Lothian : rock plants.

Lady French, Crowthorne : *Wistaria floribunda*.

Messrs. Garways, London, W. 1 : succulents.

Mr. A. Hansen, New Barnet : rock plants.

Misses Hopkins, Coulsdon : rock plants.

Collingwood Ingram, Esq., Benenden : *Linaria triornithophora*, *Gladiolus eximius* × G. 'Brilliant.'

Mr. A. Kench, Weybridge : *Jankaea Heldreichii*.

Marsden Nurseries, Ashted : rock plants.

Lt.-Col. Messel, Handcross : *Calceolaria tenella*, *Lilium occidentale*.

Messrs. Russell, Richmond : rock plants.

W. I. Whitaker, Esq., Lymington : *Asimina triloba*.

Messrs. T. Yano, Portman Sq., W. 1 : Japanese dwarf trees.

June 28, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

First-Class Certificate.

To *Fabiana imbricata*, mauve form, as a tender flowering shrub (votes 14 for), from the Rt. Hon. Lord Swaythling, Southampton. A rather spreading, heath-like shrub from Chile. The small, tubular flowers were thickly massed around each of the short, lateral shoots on the large branches exhibited. In this form the flowers are of a somewhat indecisive mauve tint, to some less attractive than the purity of the typical white-flowered plant.

Award of Merit.

To *Brodiaea congesta* as a hardy flowering plant (votes unanimous), from The Director, R.H.S. Gardens, Wisley. A hardy North American bulbous plant of graceful habit and rapid increase. The lavender-blue flowers are borne in large umbels on slender scapes 18 inches high.

To *Zenobia speciosa* as a hardy flowering plant (votes unanimous), from the Rt. Hon. Lord Swaythling, Southampton. This differs from the variety *pulverulenta*, described above, in its green foliage and smaller flowers. Several large branches, bearing numerous clusters of flowers, were exhibited.

Cultural Commendation.

To T. Hay, Esq., Hyde Park, for flowering specimens of *Lilium parvum*. A pretty American species. The slender stems bear whorls of light green leaves and several small, campanulate flowers in various shades of orange-yellow, spotted internally with crimson.

Other Exhibits.

Dr. P. L. Giuseppi, Felixstowe : *Weldenia candida*, *Anomatheca juncea*.

Sir Wm. Lawrence, Bt., Burford : *Osteospermum sericeum*, *Godetia nana*.

Miss D. H. Moutray Read, Wadhurst : *Rosa Fargesii*.

July 5, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Wallace, Tunbridge Wells, for Lilies and other bulbous plants.

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Silver-gilt Banksian Medal.

To Mr. W. A. Constable, Paddock Wood, for Lilies.

Silver Banksian Medal.

To Mr. Amos Perry, Enfield, for Lilies and other hardy plants.

Banksian Medal.

To Mr. G. Reuthe, Keston, for shrubs and hardy plants.

To J. E. H. Stooke, Esq., Hereford, for Lilies.

To the Rt. Hon. Lord Swaythling, Southampton, for Lilies.

Award of Merit.

To *Allium giganteum* as a hardy flowering plant (votes 12 for, 1 against), from Mr. Amos Perry, Enfield. A robust species from Central Asia. The bulb produces a cluster of six to nine flaccid, somewhat glaucous leaves 18 inches long. From the centre of these rises a stout scape 4 feet high bearing a terminal globose umbel of small, lilac flowers.

To *Campanula alsinoides* as a flowering plant for rock garden or alpine house (votes 9 for), from T. Hay, Esq., Hyde Park. This occurs in Kashmir at an altitude of 11,000 feet. The small, bell-shaped flowers are carried singly, and are white, veined with purple. The wiry, ascending stems, which are clothed with grey, hairy, ovate leaves, reach a height of about 6 inches.

To *Lilium candidum*, Salonika variety, as a hardy flowering plant (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. Among the several varieties of the Madonna Lily this is perhaps the most valuable, as it is stated to be immune from, or at least highly resistant to, the Botrytis disease of Lilies. It has, moreover, the desirable quality of producing abundant fertile seed. The specimens exhibited bore rather close racemes of flattish, pure white flowers.

To *Lilium* × 'Coolhurst hybrid' as a hardy flowering plant (votes 16 for), from C. R. Scrase-Dickens, Esq., Horsham. A fine, vigorous variety of the Orange Lily. The leafy stems reach a height of 4 or 5 feet, bearing a terminal umbel of six or eight large, erect, orange flowers spotted with crimson.

To *Lilium* × *cromottiae* as a hardy flowering plant (votes 11 for), from J. E. H. Stooke, Esq., Hereford. A very striking hybrid raised from the cross *L. croceum* × *L. willmottiae*. The large pyramidal inflorescence exhibited bore sixty flowers and unopened buds. The rich orange, crimson-spotted flowers stand out on horizontal pedicels, and in shape show the influence of *L. willmottiae*.

To *Lilium parvum luteum* as a hardy flowering plant (votes 7 for, 1 against), from J. E. H. Stooke, Esq., Hereford. *Lilium parvum* is a slender-growing Californian species rather difficult to establish. This variety, which is of somewhat stronger growth than the type, has flowers of clear yellow, lightly spotted with purple.

To *Trichodesma Boissieri* as a greenhouse flowering plant (votes 10 for), from Lt.-Col. H. C. Elwes, D.S.O., Cheltenham. A very beautiful, half-shrubby plant belonging to Boraginaceae, and native of Transjordan. The ovate-lanceolate leaves are covered by a dense, silvery pubescence. The large, star-shaped, pale blue flowers are arranged in slightly pendent cymes.

Preliminary Commendation.

To *Gentiana* 'Merstham hybrid' as a hardy flowering plant (votes unanimous), from Mr. W. Wells, jun., Merstham. Stated to have been raised from the cross *G. Pneumonanthe* × *G. lagodechiana*, and resembling the latter.

Other Exhibits.

Col. A. E. Barchard, Uckfield : *Lilium bulbiferum brechleyense*.

Major L. H. Brammall, Bickley : alpine plants.

Viscountess Byng of Vimy, Thorpe-le-Soken : *Phygelius aquatilis*.

Mrs. W. R. Dykes, Woking : *Lilium Martagon*.

Lt.-Col. H. C. Elwes, Cheltenham : *Lupinus* sp.

Mr. A. Hansen, New Barnet : rock plants.

Lt.-Col. L. C. R. Messel, Handcross : *Clematis* sp. (K.W.)

Lt.-Col. G. S. F. Napier, Horeham Road : *Lilium philadelphicum* var. *andinum*, *L. concolor* var. *pulchellum*.

Mr. Amos Perry, Enfield : *Calochortus Lyonii*.

Messrs. L. R. Russell, Richmond : shrubs and rock plants.

J. E. H. Stooke, Esq., Hereford : *Lilium occidentale*, *L. croceum* × *L. elegans*, *L. Martagon* × *L. Hansonii*.

Messrs. R. Wallace, Tunbridge Wells : varieties of *Lilium* × *Backhousiae*.

Mr. W. Wells, jun., Merstham : *Thalictrum dipterocarpum* (K.W. 5899).

Mrs. E. M. Wightman, Bengoe : *Lilium Martagon*.

July 19, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, twenty-four other members and Lt.-Col. G. S. F. NAPIER, Dr. FRED STOKER, and Capt. R. C. H. JENKINSON (members of the Lily Committee) present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. W. A. Constable, Paddock Wood, for Lilies.

To Messrs. R. Wallace, Tunbridge Wells, for Lilies and aquatic plants.

Silver Banksian Medal.

To Messrs. Wm. Artindale, Sheffield, for *Lilium testaceum*.

To the Hocker Edge Gardens, Cranbrook, for Lilies.

To Messrs. W. T. & H. E. Neale, Newhaven, for succulents.

Banksian Medal.

To Miss Billington, Ashford, for *Lilium longiflorum* var. *Harrisii*.

To Knap Hill Nurseries, Woking, for Lilies and shrubs.

To Messrs. Maxwell & Beale, Broadstone, for alpine plants.

To Mr. Amos Perry, Enfield, for Lilies and other hardy plants.

To J. E. H. Stooke, Esq., Hereford, for Lilies.

To Messrs. T. Yano, Portman Sq., W. 1, for dwarf trees.

Award of Merit.

To *Campanula versicolor* as a hardy flowering plant (votes unanimous), from G. P. Baker, Esq., Sevenoaks. An uncommon species introduced from Greece nearly a century and a half ago. It is a good perennial, forming a basal rosette of long-stalked, oblong, coarsely serrate leaves. The saucer-shaped flowers are deeply cleft, with a dark violet central zone and paler lobes, and are borne in an ample thyrses.

To *Lilium* × *Will-crowdii* as a hardy flowering plant (votes 19 for), from J. E. H. Stooke, Esq., Hereford. A vigorous hybrid Lily, of which the parentage is stated to be *L. Willmottiae* crossed with *L. croceum* × *L. Davidi*. The plant from which the specimen exhibited was cut reached a height of 6 feet. The rich orange, spotted flowers are much like those of *Lilium* × *cromottiae*.

Preliminary Commendation.

To *Campanula Piperi* as a flowering plant for rock garden or alpine house (votes 11 for), from Mr. W. Wells, jun., Merstham. An attractive North American species. It forms a small rosette of serrate, spatulate leaves, from among which rise slender stems bearing one or two starry, pale blue flowers.

Cultural Commendation.

To Messrs. Wm. Artindale, Sheffield, for an exhibit of a large number of well-grown spikes of *Lilium testaceum*.

Other Exhibits.

Viscountess Byng of Vimy, Thorpe-le-Soken : *Lilium pardalinum* × *L. Parryi*.

Mr. W. A. Constable, Paddock Wood : *Lilium* × *Maxwell*, *L. pardalinum* var. *giganteum*.

J. Gilbert, Esq., Harrogate : *Calceolaria* hybrid.

Dr. P. L. Giuseppi, Felixstowe : *Lobelia tomentosa*.

The Bishop of Gloucester, Barnard Castle : *Gentiana Loderi*.

Lt.-Col. C. H. Grey, Cranbrook : *Monardella macrantha*.

Collingwood Ingram, Esq., Benenden : *Hispidella hispanica*, *Iberis Welwitschii*.

Sir Wm. Lawrence, Bt., Burford : *Calceolaria tenella*, *Silene californica*.

Messrs. Maxwell & Beale, Broadstone : *Erica cinerea* 'C. D. Eason.'

Mrs. R. S. Milford, Chedworth : *Sutera phlogifolia*.

Lt.-Col. G. S. F. Napier, Horeham Road : *Lilium pardalinum* × *L. Parryi*.

Owermoine Nurseries, Dorchester : rock plants and shrubs.

Mr. J. B. Payne, Fingringhoe : *Salvia turkestanica*.

Mrs. Spender Clay, Lingfield : Lilies.

J. E. H. Stooke, Esq., Hereford : *Lilium pardalinum* × *L. Parryi*.

Messrs. Sutton, Reading : *Venidium* × *fastulaceum*.

Messrs. R. Wallace, Tunbridge Wells : *Lilium sutchuenense* var. *immaculatum*.

Mr. W. Wells, jun., Merstham : *Gentiana* hybrids.

August 9, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, fourteen other members and Lt.-Col. G. S. F. NAPIER (member of the Lily Committee) present.

Awards Recommended :—

Banksian Medal.

To Messrs. W. T. & H. E. Neale, Newhaven, for succulents.

Award of Merit.

To *Campanula mollis* as a flowering plant for the alpine house (votes 10 for), from Major L. H. Brammall, Bickley. A dainty species from limestone rocks of

Southern Europe. It forms a rosette of silver-tomentose spatulate leaves from the axils of which are produced the slender, spreading inflorescences. These are leafy, and each bears several open, star-shaped flowers of pale blue. Probably too tender to succeed in the open.

To *Campanula Morettiana* as a flowering plant for the alpine house (votes 7 for), from Messrs. Clarence Elliott, Stevenage. A small species from the Dolomites. The heart-shaped leaves are hairy and lightly serrate, forming little tufts out of which rise 2- to 3-inch stalks bearing relatively large, erect, violet bells.

To *Gladiolus psittacinus* as a hardy flowering plant (votes 10 for), from R. D. Trotter, Esq., Ockley. The flowers exhibited were grown from corms introduced from Bogota, Colombia, where this South African species has become naturalized. It is a handsome plant of erect growth. The stems and spathes are dark green, flushed with purple, the somewhat distant flowers of medium size, bright yellow, margined and flecked with scarlet.

Other Exhibits.

R. Bevan, Esq., Henley-on-Thames : *Gilia grandiflora*.

Misses Hopkins Coulsdon : rock plants.

Messrs. Hughes & Son, Sutton Green : *Hoheria populnea*.

Mr. A. Kench, Weybridge : alpine plants.

Sir W. Lawrence, Bt., Burford : *Mutisia subulata*.

G. W. E. Loder, Esq., Ardingly : *Triosteum perfoliatum*, *Schizandra rubrifolia*.

C. T. Musgrave, Esq., Godalming : *Gentiana* × *hascombensis*.

Lt.-Col. G. S. F. Napier, Horeham Road, E. Sussex : *Lilium* × *Maxwell*.

Messrs. Redgrove & Patrick, Sevenoaks : shrubs and rock plants.

Messrs. Russell, Richmond : rock plants and climbers.

F. J. Strover, Esq., S. Norwood : *Haemanthus natalensis*.

Sir Oscar Warburg, Epsom : forms of *Erica cinerea*, *Calluna vulgaris*.

Miss E. Willmott, Great Warley : *Cotoneaster rhamnoides*.

August 23, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended :—

Silver-gilt Lindley Medal.

To Sir Oscar Warburg, Epsom, for an exhibit of young plants, branches, and fruits of species of *Quercus* (see p. 161).

Banksian Medal.

To Mr. W. A. Constable, Paddock Wood, for *Liliums*.

Award of Merit.

To *Koelreuteria paniculata* as a hardy flowering tree (votes unanimous), from The Director, University Botanic Garden, Cambridge. A handsome deciduous tree, native of China, Korea and Japan. The large, pinnate leaves have up to fifteen ovate leaflets, coarsely toothed or lobed. The small yellow flowers are produced in large, terminal panicles. Unusually fine flowering branches were exhibited.

To *Nymphaea* 'Sunrise' as a hardy aquatic flowering plant (votes unanimous), from Lionel de Rothschild, Esq., Exbury. A beautiful hardy hybrid Waterlily with long, pointed petals of canary-yellow, fading slightly with age. The richness of the flower is augmented by the central cluster of glowing golden stamens.

Other Exhibits.

Messrs. P. S. Hayward, Clacton-on-Sea : *Antholyza paniculata*.

Mr. T. Smith, Newry : *Calceolaria alba*.

JOINT RHODODENDRON COMMITTEE.

There was no business before the Committee on February 23, March 8, and March 22, 1932.

April 5, 1932, Mr. W. J. BEAN in the Chair, and nine other members present.

Award Recommended :—*Award of Merit.*

To *Rhododendron Taggianum* as a tender flowering shrub (votes 6 for, 2 against), from the Marquess of Headfort, Kells. A species allied to *R. Maddenii*, collected by Forrest in North-eastern Upper Burma (No. 26440). It is a small shrub of somewhat lax growth, with scattered, glandular, oblong-lanceolate leaves. The umbellate inflorescence is three-flowered, the flowers large, solid, white with a central yellow blotch and deliciously fragrant.

Other Exhibits.

Col. Stephenson R. Clarke, C.B., Haywards Heath : *R. Reginaldii*.

Collingwood Ingram, Esq., Benenden : *R. moupinense* pink form.

Lady Loder, Horsham : *R. strigillosum* (shown as *R. pachytrichum*).

April 26, 1932, Mr. E. H. WILDING in the Chair, and nine other members present.

Award Recommended :—*Award of Merit.*

To *Rhododendron* 'Carex' as a hardy flowering shrub (votes 6 for), from Lionel de Rothschild, Esq., Exbury. This is thought by the exhibitor to be a chance hybrid between *R. irroratum* and *R. Fargesii*. It forms a rounded, compact bush bearing numerous deep green oblong leaves and flattish trusses of rich pink flowers, shaded externally with a darker tint.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant : *R. lemoense*, *R. 'Tregedna'*.

E. M. Preston, Esq., Hayes : *R. sp.* Forrest 276.

Mr. G. Reuthe, Keston : *R. arboreum nigrum*.

Lionel de Rothschild, Esq., Exbury : *R. 'Madeleine'*.

Knaphill Nursery, Ltd., Woking : *R. tsangpoense*.

'Sunlight'

'ile,'

May 3, 1932, Mr. G. W. E. LODER in the Chair, and 13 other members present.

Awards Recommended :—*Award of Merit.*

To *Rhododendron* 'Aries' as a hardy flowering shrub (votes 7 for), from Sir John F. Ramsden, Bt., Gerrard's Cross. A handsome hybrid of *R. Thomsonii* × *R. neriiflorum*, raised by the exhibitor. It is a low-growing plant flowering freely at a height of 18 inches. The ruby-red flowers resemble those of the former parent and are borne in lax, few-coloured trusses.

To *Rhododendron* 'Calfort' as a hardy flowering shrub (votes 7 for, 2 against), from Collingwood Ingram, Esq., Benenden. A hybrid of *R. calophyllum* × *R. Fortunei*, raised in France. The large, lanceolate leaves spread widely from the base of the flower-cluster, which is compact and of good form. The flowers are pink in the bud and white when fully expanded, marked externally with rosy-lilac.

To *Rhododendron* 'F. C. Puddle' as a hardy flowering shrub (votes unanimous), from Lady Aberconway and the Hon. H. D. McLaren, Bodnant. A most attractive hybrid from *R. neriiflorum* and *R. Griersonianum*, raised by the exhibitors. The semi-pendulous flowers are carried in loose trusses, and as might be expected of such parentage, are of a peculiar and brilliant reddish-scarlet colour. The hybrid also shows the influence of *R. neriiflorum* in its fleshy, coloured calyx.

To *Rhododendron* 'May Day' as a hardy flowering shrub (votes unanimous), from A. M. Williams, Esq., Launceston. Another striking hybrid raised by the exhibitor from *R. haematodes* × *R. Griersonianum*. It is a rather sparsely-foliaged erect grower, with the hairy young growths of the latter parent. The flowers are cerise-scarlet in colour and are borne in loose clusters.

To *Rhododendron repens* var. *chamaedoxa* as a hardy flowering shrub (votes 7 for), from Lady Aberconway and the Hon. H. D. McLaren, Bodnant. This is Kingdon Ward's 'Scarlet Pimpernel' (No. 5846), collected in Tibet in 1925. A creeping under-shrub clothed with small dark green leaves of leathery texture. The tubular-campanulate flowers are fleshy, crimson, and borne singly or two or three together.

To *Rhododendron* 'White Samite' as a hardy flowering shrub (votes 6 for, 3 against), from Messrs. R. Wallace, Tunbridge Wells. This was raised by Messrs. Wallace from seed obtained from a cross effected by Mr. Wormald of Dereham between *R.* 'Corry Koster' and *R. Loderi*. A very pretty plant bearing numerous large trusses, compact and shapely, of medium-sized, white flowers with daintily undulated corollas and pale green stalks.

Other Exhibits.

Sir John F. Ramsden, Bt., Gerrard's Cross : *R. uniflorum*, *R. tsangpoense*.

The Rt. Hon. Lord Swaythling, Southampton : hybrids of *R. campylocarpum* × *R. Fortunei*.

Messrs. Waterer, Sons & Crisp, Bagshot : *R.* 'Kate Greenaway.'

May 10, 1932, Mr. E. H. WILDING in the Chair, and seven other members present.

The Rt. Hon. Lord Swaythling, Southampton : *R.* 'Imperator.'

May 24, 1932, Mr. E. H. WILDING in the Chair, and ten other members present.

Awards Recommended :—

First-class Certificate.

To *Rhododendron* 'Lady Rosebery' as a hardy flowering shrub (votes unanimous), from Lionel de Rothschild, Esq., Exbury. This beautiful hybrid received the A.M. on May 20, 1930, and is described in the JOURNAL, 56, p. xxvii.

Award of Merit.

To *Rhododendron* 'Cock of the Rock' as a hardy flowering shrub (votes unanimous), from Col. Stephenson R. Clarke, C.B., Haywards Heath. The tubular-campanulate flowers of this variety are somewhat pendulous, the inside of the corolla clear orange, the outside suffused with ruby-red on orange. The ovate leaves are rich green above, and covered beneath with brown tomentum.

To *Rhododendron* 'Mrs. J. Comber' as a hardy flowering shrub (votes 6 for, 1 against), from Lt.-Col. L. C. R. Messel, O.B.E., Handcross. A single truss of this very fine variety was shown, and this was large and of good form. The texture of the leaves is solid, widely expanded, white except for a suggestion of the Directa at the base of the corolla.

To *Rhododendron* 'Orbhoulst' as a hardy flowering shrub (votes 8 for), from fifteen E. Loder, Esq., Ardingly. A beautiful hybrid of vigorous growth, raised from a cross between *R. orbiculare* and the closely related *R. Houlstonii*. The leaves are broadly ovate, rounded at both ends, dark green above and paler, almost glaucous beneath. The widely campanulate, pink flowers are carried in rather loose, rounded trusses.

To *Rhododendron timeleum* as a hardy flowering shrub (votes unanimous), from Lionel de Rothschild, Esq., Exbury. Shown under the number 59593 of Rock. This species comes from the Mu-li Mountains of South-Western Szechwan, where it grows at an altitude of 11,000 feet. It makes a shapely bush with small, oblong leaves and neat terminal clusters of shapely, rosy-purple flowers. Very like *R. oreotrephe*s.

To *Rhododendron verruculosum* as a hardy flowering shrub (votes 7 for), from Col. Stephenson R. Clarke, C.B., Haywards Heath. A member of the large Lapponicum Series. It is a small shrub to 3 feet in height, with short, scaly branchlets bearing tiny leaves covered above and below with scales. The purple flowers are $\frac{1}{2}$ -inch long, and appear singly from terminal buds.

To *Rhododendron zaleucum* as a hardy flowering shrub (votes 6 for), from Col. Stephenson R. Clarke, C.B., Haywards Heath. A species of the Triflorum Series, forming a shrub or small tree as much as 35 feet high. The small, lanceolate leaves are green above and very glaucous and scaly beneath. The terminal inflorescence is 3- to 4-flowered, the flowers mauve-pink, slightly spotted within.

Other Exhibits.

Lady Aberconway and the Hon. H. D. McLaren, Bodnant : *R.* 'Bodnant Sunrise,' *R.* 'Lind-dal.'

Messrs. L. J. Endtz, Boskoop : Azalea 'Twofold,' *A.* 'Snow Fairy' and *A.* 'Red Dragon.'

Mrs. Philip Martineau, Ascot : *R.* 'Judith.'

June 7, 1932, Mr. E. H. WILDING in the Chair, and seven other members present.

Awards Recommended :—

First-class Certificate.

To *Rhododendron chasmanthum* as a hardy flowering shrub (votes 6 for), from Lionel de Rothschild, Esq., Exbury. This beautiful, free-flowering species received the A.M. on June 3, 1930 (see JOURNAL, 56, p. xxx). It is a Chinese species with tapered, lanceolate leaves and lilac or mauve, slightly spotted flowers.

Award of Merit.

To *Rhododendron* 'Chalice' as a tender flowering shrub (votes 6 for), from Col. Stephenson R. Clarke, C.B., Haywards Heath. A most beautiful hybrid between *R. cinnabarinum* and *R. Maddenii*. The leaves are rather small, lanceolate, shining green above, somewhat paler beneath. The flowers are pendent, tubular, pale pink within, creamy-pink suffused with rose externally, and are borne in loose trusses.

Other Exhibits.

Col. S. R. Clarke, C.B., Haywards Heath : *R.* 'Lapageria,' *R.* 'Afterglow.'

Dame Alice Godman, D.B.E., Horsham : *R.* 'Cooper's Maddenii.'

Lionel de Rothschild, Esq., Exbury : *R.* 'Lady Harcourt,' Azalea 'Hotspur' and A. 'George Reynolds.'

June 21, 1932, Mr. E. H. WILDING in the Chair, and ten other members present.

Awards Recommended :—

Award of Merit.

To *Rhododendron* 'Damask' as a hardy flowering shrub (votes 8 for), from Col. Stephenson R. Clarke, C.B., Haywards Heath. A very charming hybrid raised from the cross *R. Loderi* × *R. eriogynum*. The flowers are borne in a large compact truss. The corolla is of good substance, widely expanded, and bright rose-pink in colour.

To *Rhododendron* 'Moser's Maroon' as a hardy flowering shrub (votes 6 for, 1 against), from Lionel de Rothschild, Esq., Exbury. A hybrid of unusually intense colouring. The well-formed truss is made up of shapely red-maroon flowers marked inside with large darker spots.

To *Rhododendron* 'Romany Chai' as a hardy flowering shrub (votes 8 for), from Lionel de Rothschild, Esq., Exbury. This valuable variety was obtained from the cross *R.* 'Moser's Maroon' × *R. Griersoni*. The inflorescence is large and compact, the flowers of good form and in a rich, glowing terra-cotta.

Other Exhibits.

Mrs. Philip Martineau, Ascot : *R.* 'The President,' *R.* 'Eileen,' *R.* 'Sunlight Corner.'

Lionel de Rothschild, Esq., Exbury : *R. apodectum*, *R. cyclium*, *R.* 'Cecile,' *R.* 'Norman Shaw, No. 2.'

June 28, 1932, Mr. E. H. WILDING in the Chair, and eight other members present.

Award Recommended :—

Award of Merit.

To *Rhododendron* 'Romany Chal' as a hardy flowering shrub (votes 6 for), from Lionel de Rothschild, Esq., Exbury. A hybrid of *R.* 'Moser's Maroon' crossed with *R. eriogynum*. The widely-campanulate flowers are nicely arranged in a compact truss, of medium size, and of a glowing scarlet-maroon colour, with dark spots on the inside of the upper segments of the corolla.

Other Exhibits.

Lionel de Rothschild, Esq., Exbury : *R.* 'Constance,' *R. sp.* K.W. 6250.

JOINT DAHLIA COMMITTEE.

August 11, 1931, Mr. H. B. MAY, V.M.H., in the Chair, and five other members present.

Selected for trial at Wisley.

From Mr. W. H. Pritchard, Corsham, Wilts :

'Henry Burgess' (Coltness).

From Messrs. Stredwick, St. Leonards-on-Sea :

'A. T. Barnes' (Dec.), 'Freemason' (Cactus), 'Helen Hooper' (Dec.),

'Marjory Horne' (Dec.), 'Pink Prestige' (Dec.), 'Sunflower' (Dec.),

'Victoria' (Cactus).

Dahlias were also submitted by :—

Mr. T. H. Thornton, Knowle, nr. Birmingham.

August 25, 1931, Mr. H. B. MAY, V.M.H., in the Chair, and five other members present.

Selected for trial at Wisley.

From Messrs. Stredwick, St. Leonards-on-Sea :

'Commander Highfield' (Dec.), 'Frigate' (Cactus), 'Fusee' (Dec.),

'Indian' (small Dec.), 'J. B. Riding' (Dec.), 'Laurentic' (Dec.),

'Mayor Ormerod' (Dec.), 'Montrose' (Dec.), 'Robin' (small Dec.).

From Messrs. W. Treseder, Cardiff :

'A. A. Pettigrew' (Charm), 'Caldicot Castle' (Charm), 'Freda

Pawley' (Charm).

From Mr. J. T. West, Brentwood :

'Aureen' (small Dec.), 'Dick' (Pompon), 'Dorcas' (small Dec.),

'Gladness' (small Dec.), 'Glare' (small Dec.), 'Mr. Arthur Burns'

(Dec.), 'Mrs. Catherine Clark' (dwarf Dec.), 'Peter' (small Dec.),

'Useful' (small Dec.).

Dahlias were also submitted by :—

Mr. L. C. Messrs. Cheal, ~~the very~~ ^{texture,} was sh

The September 8, 1931, Mr. H. B. MAY, V.M.H., in the Chair, and eight other members present.

Selected for trial at Wisley.

From Messrs. Cheal, Crawley :

'Dame Alice Godman' (small-fld. Pæony), 'Lowfield Star' (Star),

'Miss Edith Godman' (small-fld. Pæony).

From Messrs. Langridge, Westerham :

'Langridge's Little Wonder' (small-fld. Pæony).

From Mr. J. B. Pearman, Warnham :

'Robin Pearman' (Dec.).

The awards recommended to Dahlias on trial at Wisley were confirmed.

September 10, 1931, Mr. H. B. MAY, V.M.H., in the Chair, and eight other members present.

Selected for trial at Wisley.

From Messrs. Ballego, Leiden, Holland :

'Ballego's Glory' (Dec.).

From Mr. J. F. Barwise, Burnley :

'Towneley Pride' (small Dec.).

From Messrs. Carlée, Haarlem, Holland :

'Kareol' (Cactus).

From Messrs. Gibson & Amos, Cranleigh :

'Little David' (Pompon).

From Messrs. Sandford, Mildenhall :

'Mrs. R. Sandford' (small Dec.).

From Messrs. Topsvoort, Aalsmeer, Holland :

'Ami Choquet' (Dec.).

From Mrs. G. M. Tylden Wright, Windsor Forest :

'Master Michael' (Pompon).

Dahlias were also submitted by :—

Messrs. Bekker, Haarlem, Holland.
 Messrs. Bruidegom, Baarn, Holland.
 Mr. J. Isaacs, Slough.
 Mr. K. Maarse, Dz., jun., Aalsmeer, Holland.
 Mr. J. Rhodes, Pontefract.
 Mr. G. J. Squibbs, Burton-on-Trent.
 Mrs. Stevenson, Stoke Poges.
 Messrs. Stredwick, St. Leonards-on-Sea.
 Messrs. W. Treseder, Cardiff.
 Mr. J. T. West, Brentwood.
 Mr. H. Woolman, Birmingham.

September 23, 1931, Major G. CHURCHER in the Chair, and seven other members present.

Selected for trial at Wisley.

From Messrs. Burrell, Cambridge :

'Lila' (Charm), 'Vedic' (small Dec.).

From Messrs. Cheal, Crawley :

'Lowfield Scarlet' (Dec.), 'Winnie' (Cactus).

From A. J. Cobb, Esq., Reading :

'Conwyn' (small-fld. Pæony).

From Messrs. Dickson & Robinson, Manchester :

'C. E. Compson' (Dec.), 'Northern Beauty' (Dec.).

From Messrs. Stredwick, St. Leonards-on-Sea :

'Dorcas' (small Dec.), 'Evelyn' (small Dec.), 'Imperial' (Dec.),

'Purple Emperor' (Dec.), 'Selborne' (small Dec.).

From Mr. T. E. Tomalin, Rowlands Castle :

'Bessborough Scarlet' (Dec.), 'Lady Moyra Ponsonby' (small Dec.),

'Ruth Tomalin' (Dec.).

From Mr. J. T. West, Brentwood :

'Horizon' (small Dec.), 'Youth' (small Dec.).

Dahlias were also submitted by :—

Messrs. Dobbie, Edinburgh.

Mr. S. Ogg, Swanley.

Messrs. Rich & Cooling, Bath.

B. Rubenstein, Esq., Rustington.

September 30, 1931, Mr. G. W. LEAK, V.M.H., in the Chair, and seven other members present.

Selected for trial at Wisley.

From Messrs. Cheal, Crawley :

'Apricot Gem' (Dec.), 'Purple Profusion' (small Dec.), 'The Severn' (small Dec.).

From Messrs. Jarman, Chard :

'Vanity' (small Dec.).

From Mr. J. B. Riding, Chingford :

'Alex Craig' (Cactus), 'Madame Flore Braem' (Cactus).

From Mr. J. T. West, Brentwood :

'Little Jean' (small Dec.), 'Relief' (small Dec.), 'Roger' (small Dec.).

Dahlias were also submitted by :—

Messrs. Carlée, Haarlem, Holland.

Miss E. I. Hall, Caversham.

Mr. E. Poole, Prees.

Mr. W. Yandell, Maidenhead.

October 6, 1931, Mr. T. HAY, V.M.H., in the Chair, and six other members present.

Selected for trial at Wisley.

From A. J. Cobb, Esq., Reading :

'Violet Hodge' (small-fld. Pæony).

From Mr. J. T. West, Brentwood :

'Donald Clark' (small Dec.).

Dahlias were also submitted by :—

W. S. Cottingham, Esq., Maidenhead.

Messrs. W. Wood, Taplow.

JOINT GLADIOLUS COMMITTEE.

August 25, 1931, Mr. W. CUTHBERTSON, V.M.H., in the Chair, and five other members present.

Awards Recommended :—

Preliminary Commendation.

To Gladiolus 'Helen Howard' for exhibition (votes unanimous), from Major G. Churcher, Lindfield.

The awards recommended to Gladioli on trial at Wisley were confirmed.

Other Exhibits.

Major G. Churcher, Lindfield: Gladioli 'Golden Apricot,' 'Harry Selz,' 'Golden Victor,' 'Maud Muller.'

J. L. Holbrook, Esq., Chingford: Gladioli 'Jessica,' 'Gwen,' 'Apple Blossom,' 'Pendragon,' 'Newlyn,' 'Chingford Queen,' 'Pride of Chingford,' 'Adeline Holbrook.'

September 8, 1931, Mr. G. W. LEAK, V.M.H., in the Chair, and five other members present.

Awards Recommended :—

Award of Merit.

To Gladiolus 'Gloriana' for exhibition and cutting (votes unanimous), from Messrs. Gibson & Amos, Cranleigh. A large-flowered American variety, with light salmon-pink flowers suffused with yellow.

To Gladiolus 'Orange Butterfly' for exhibition and cutting (votes unanimous), from Major G. Churcher, Lindfield. A frilled primulinus variety. Spike dense, flowers bright orange, yellow in the tube.

Preliminary Commendation.

To Gladiolus 'Seagull' for exhibition and cutting (votes unanimous), from J. L. Holbrook, Esq., Chingford.

Other Exhibits.

Major G. Churcher, Lindfield: Gladioli 'Apricot Glow,' 'Sunnymede,' 'Grace Clark,' 'Ferne Kyle,' 'Jap Lady.'

J. L. Holbrook, Esq., Chingford: Gladioli 'Chingford Peach-blossom,' 'Bude,' 'Clarissa,' 'Arthur Koerner,' 'Polruan.'

September 23, 1931, Major G. CHURCHER in the Chair, and six other members present.

Awards Recommended :—

Award of Merit.

To Gladiolus 'Flosella' for exhibition (votes unanimous), from Messrs. Gibson & Amos, Cranleigh. A charming, large-flowered variety of Canadian origin. The colour is a bright, pale salmon-pink.

Preliminary Commendation.

To Gladiolus 'Betty Nuthall' for exhibition (votes unanimous), from Messrs. Gibson & Amos, Cranleigh.

Other Exhibits.

Messrs. Gibson & Amos, Cranleigh: Gladiolus 'Dorothy Simpson.'

J. L. Holbrook, Esq., Chingford: Gladioli 'Royal Crusader,' 'Scarlet Knight,' 'Looe,' 'King Richard.'

September 30, 1931, Mr. G. MONRO, C.B.E., in the Chair, and six other members present.

Awards Recommended :—

Award of Merit.

To Gladiolus 'Mildred Pettman' for exhibition (votes unanimous), from Major G. Churcher, Lindfield. A show variety raised in America. The flowers, which are pale salmon-pink on a cream ground, are carried in long, slender spikes.

To Gladiolus 'Minuet' for exhibition (votes unanimous), from Messrs. R. H. Bath, Wisbech. Spike long, flowers pale lilac with lemon-yellow markings.

Preliminary Commendation.

To Gladioli 'De Lionne,' 'Don of Peratta' (votes unanimous), from Messrs. Gibson & Amos, Cranleigh.

Other Exhibits.

Capt. Churcher, Ash Manor, Kent: Gladiolus 'Oriflamme.'

Messrs. Gibson & Amos, Cranleigh: Gladiolus 'Sir Thomas Lipton.'

JOINT IRIS COMMITTEE.

May 24, 1932, Major F. C. STERN, O.B.E., F.L.S., in the Chair, and eleven other members present.

Exhibits.

Mrs. E. Lloyd Edwards, Trevor : *Iris bucharica*.

Fred Stoker, Esq., Loughton : *Iris gracilipes alba*.

G. P. Baker, Esq., Sevenoaks : *Iris lupina vera* ; *Iris regelio-cyclus* hybrids.

June 9, 1932. At the Iris Show. Major F. C. STERN, O.B.E., F.L.S., in the Chair, and sixteen other members present.

Award Recommended :—*First-class Certificate.*

To *Iris tingitana* var. *Fontanesii* sub-var. *latifolia* for general garden use (votes 12 for), from Major Stern, Goring-by-Sea. Described, JOURNAL R.H.S. 57, p. xxxv.

Selected for trial at Wisley.

Iris 'Mussolini,' from Mrs. W. R. Dykes, Woking.

Iris 'Ayres No. 2,' from G. L. Pilkington, Esq., Liverpool.

Iris 'Minnieford,' from F. W. Tomalin, Esq., Hampton.

Iris 'Geva,' 'Bobbingcourt,' 'Noura,' from Mrs. W. R. Dykes, Woking.

Iris 'Betelgeuse,' from Messrs. Bunyard, Maidstone.

Iris 'Brunette,' from Major F. C. Stern, Goring-by-Sea.

Iris 'Shot Shades,' 'Hollies,' from Mr. Amos Perry, Enfield.

Iris 'F. W. Tomalin,' 'Harvest Moon,' from F. W. Tomalin, Hampton.

June 21, 1932, Sir WILLIAM LAWRENCE, Bt., V.M.H., in the Chair, and ten other members present.

Awards Recommended :—*Preliminary Commendation.*

To *Iris* 'Walter Godfrey' (votes unanimous), in Chair, and fifteen other Woking. Standards slaty-purple, falls deep velvety royal.

To *Iris* 'Shot Silk' (votes unanimous), from Orpington. Standards and falls a delicate shade of pink on a yellow ground. ('Aphrodite' × 'Amber'.)

To *Iris* 'Kame' (votes unanimous), from G. P. Baker, Esq., Sevenoaks. large-flowered variety, standards and falls white, shaded and veined with blue. Height 4 feet. ('Ensorceleur' × 'Los Angeles'.)

To *Iris* 'Mardi' (votes unanimous), from G. P. Baker, Esq., Sevenoaks. Standards dull smoky-lavender, falls rich royal-purple, beard orange. Height 4 feet. ('Souvenir de Mme. Gaudichau' × 'Dominion'.)

Selected for trial at Wisley.

Iris 'Walter Godfrey,' from Mrs. W. R. Dykes, Woking.

Iris 'Shot Silk,' from Orpington Nurseries, Orpington.

Iris 'Kamet,' from G. P. Baker, Esq., Sevenoaks.

The Awards recommended to Dutch Irises on trial at Wisley were confirmed.

June 28, 1932, Sir William Lawrence, Bt., V.M.H., in the Chair, and nine other members present.

Exhibits.

Lionel de Rothschild, Esq., Exbury : *Iris* K.W. 5083. A geographical form of *Iris foetidissima*.

G. Yeld, Esq., Gerrard's Cross : *Iris* 'Nar.'

ORCHID COMMITTEE.

March 8, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and eighteen other members present.

Awards Recommended:—

Gold Medal.

To Messrs. H. G. Alexander, Tetbury, Glos., for *Cymbidiums*.

To Messrs. McBean, Cooksbridge, for *Cymbidiums*.

Silver-gilt Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

To F. J. Hanbury, Esq., East Grinstead, for a group.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, for a group.

To Messrs. Cowan, Southgate, for a group.

To S. G. Brown, Esq., Shepperton, for a group.

To Messrs. Black & Flory, Slough, for a group.

Banksian Medal.

To Messrs. Harry Dixon, Wandsworth Common, for a group.

To Mr. John Evans, Colwyn Bay, for a group.

First-class Certificate.

To *Cymbidium* × 'Olympus' var. 'Rex' ('Vesta' × *Alexanderi*) (votes 16 for, 1 against), from Messrs. H. G. Alexander. Flowers white, faintly tinged with rose, labellum marked with red on the front lobe.

To *Cymbidium* × 'Dante' ('Goosander' × 'Bullfinch') (votes 14 for, 2 against), from Messrs. H. G. Alexander. Flowers bright rose-pink, with deeper veining, labellum white with dark red spots.

To *Cymbidium* × 'Baldur' var. 'Bronze King' (*Alexanderi* × 'Castor') (votes 16 for), from Messrs. H. G. Alexander. Flowers bronze-yellow, shaded rose, labellum cream-white with red-brown marks.

Award of Merit.

To *Odontoglossum* × 'Dusky Emperor' ('L'Empereur' × 'Dusky Monarch') (votes 10 for, 5 against), from Messrs. Charlesworth. Flowers chocolate-crimson, all segments margined with white.

To *Cymbidium* × 'Princess Astrid' var. 'Alpha' ('Eagle' × 'Vesta') (votes 15 for), from Messrs. Sanders, St. Albans. Flowers light rose-pink, the labellum profusely marked with rose-purple.

To *Odontioda* × 'Selborne' (*Oda.* × 'Colinge' × *Odm.* × 'Miguelito') (votes 13 for), from Messrs. A. J. Keeling, Bradford. Flowers rich crimson-red.

To *Odontoglossum* × 'President Hoover' ('Arcturus' × 'Prince Imperial') (votes unanimous), from Messrs. McBean. Flowers round, chocolate-brown, margined with white.

To *Cymbidium* × 'Véronique' (*Lowianum* × 'Vesta') (votes 15 for), from Messrs. McBean. Flowers light buff shaded rose, the labellum with a crimson apex.

To *Cymbidium* × 'Adonis,' McBean's var. (*Coningsbyanum* × *Pauwelsii*) (votes 15 for, 2 against), from Messrs. McBean. Flowers creamy-white suffused with rose, the labellum yellowish with red spotting.

To *Cymbidium* × 'Joy Sander' var. 'Rio Tinto' (*Pauwelsii* × 'Ceres') (votes 18 for), from Messrs. McBean. Flowers of bright coppery-bronze colour, the labellum marked with crimson-red.

Cultural Commendation.

To Mr. T. King, Orchid grower to S. G. Brown, Esq., Shepperton, for *Odontioda* × 'Eastern Monarch,' with a spike of 18 flowers and buds.

Other Exhibits.

Rosalind Lady Roundway, Devizes, Wilts: *Cymbidium* × 'Madeleine' var. 'Ruperta,' of pleasing light rose-pink colour.

Messrs. A. J. Keeling: *Cypripedium* hybrids.

March 22, 1932, Mr. F. J. HANBURY in the Chair, and ten other members present.

Awards Recommended:—

Gold Medal.

To Messrs. McBean, Cooksbridge, for *Cymbidiums*.

Silver-gilt Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

To Messrs. H. G. Alexander, Tetbury, for a group.

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for a group.

Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, for a group.

To Messrs. John Cowan, Southgate, for a group.

First-class Certificate.

To *Odontoglossum crispum* var. 'Leviathan' (votes unanimous), from Messrs. Charlesworth. The spike bore ten large well-formed flowers, white, and effectively fringed. A home-raised plant.

Award of Merit.

To *Cymbidium* × 'Prospero' var. 'Ivory Beauty' (*Alexanderi* × 'Pipit') (votes 8 for), from Messrs. H. G. Alexander. Flowers of thick texture, ivory-white, the labellum marked with red-brown.

To *Cymbidium* × 'Rosalind' ('Memoria P. Janssen' × 'Goosander') (votes 9 for), from Messrs. H. G. Alexander. Flowers round, light blush in the sepals and petals, deep rose-pink in the labellum.

To *Cymbidium* × 'Ruby' (parentage ?) (votes 6 for), from Messrs. McBean. The flowers are deep rose colour, flushed with ruby, the venation somewhat darker.

Preliminary Commendation.

To *Odontoglossum* × 'crispo-Solon' var. 'Regina' (*crispum* × 'Solon') (votes unanimous), from Messrs. Charlesworth. Flowers well-formed, heavily blotched with chocolate-red.

Cultural Commendation.

To Messrs. McBean, Cooksbridge, for *Odontoglossum* × 'President Hoover' var. *giganteum*, with a spike of thirteen flowers.

Other Exhibits.

Messrs. Harry Dixon, Wandsworth Common: various Orchids.

F. J. Hanbury, Esq., East Grinstead: *Cymbidium* × 'Ceres.'

Robt. Paterson, Esq., Ardingly: *Cattleya* × 'Titrianae.'

Mrs. Carl Holmes, Hitchin: *Laeliocattleya* × 'Octavemaud.'

Baron Bruno Schröder, Englefield Green: *Millonia* × 'Lycæna.'

April 5, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and fifteen other members present.

Awards Recommended:---

Gold Medal.

To Sir Jeremiah Colman, Bt., Gatton Park, Surrey, for a group.

Silver-gilt Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

Silver Banksian Medal.

To Messrs. H. G. Alexander, Tetbury, for a group.

To Messrs. Stuart Low, Jarvis Brook, for a group.

To Messrs. Sander, St. Albans, for a group.

Banksian Medal.

To Messrs. Burstow, Haywards Heath, for a group.

To Messrs. Cowan, Southgate, for a group.

To Messrs. Harry Dixon, Wandsworth Common, for a group.

First-class Certificate.

To *Odontoglossum crispum* var. 'Princess Royal' (votes 14 for, 1 against), from Messrs. Charlesworth. Spike of nine large flowers, over 4 inches across. A home-raised plant.

To *Cymbidium* × 'Princesse Astrid' var. 'Alcestris' ('Eagle' × 'Vesta') (votes 14 for, 1 against), from Messrs. H. G. Alexander. Spike of seven flowers, white, the lip marked with rose-red.

Award of Merit.

To *Cymbidium* × 'Butterfly' var. 'Old Quarry' (*insigne* × *Lowio-grandiflorum*) (votes 10 for, 1 against), from Messrs. Burstow. Spike of twelve flowers, cream-white, the labellum much spotted with crimson.

To *Dendrobium Sanderae*, Burdett's var. (votes 12 for), from Henry P. Lawson, Esq., Lynbrook, Dorking. Probably the largest form yet seen of this Bornean species.

Cultural Commendation.

To Messrs. McBean, for *Oncidium superbiens*, with a trailing spike bearing about sixty flowers.

Other Exhibits.

Baron Schröder, Englefield Green : *Potinara* × 'Meg Darell.'
Messrs. McBean : *Oncidium* × *McBeanianum*.
F. J. Hanbury, Esq., East Grinstead : *Cymbidium* × 'Pearl.'
R. Heron, Esq., Golders Green : *Odontoglossum* × *Heronae*.

April 26, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and seventeen other members present.

Awards Recommended :—

Gold Medal.

To Mrs. Carl Holmes, The Node, Hitchin, for a group.
To Messrs. Charlesworth, Haywards Heath, for a group.

Silver Banksian Medal.

To Messrs. Stuart Low, Jarvis Brook, for a group.
To Messrs. McBean, Cooksbridge, for a group.
To Messrs. Sanders, St. Albans, for a group.

First-class Certificate.

To *Odontoglossum* × 'Alorcus' var. 'Goliath' ('Llewellyn' × *crispum*) (votes unanimous), from Messrs. Charlesworth. The spike bore eight massive flowers, each over four inches across, white, flushed with rose on the back.

Award of Merit.

To *Odontoglossum* × 'Hermes' ('Serapis' × 'St. James') (votes 11 for), from Messrs. Charlesworth, Haywards Heath. The spike bore ten large and well-formed flowers of bright crimson-purple colour.

To *Miltonia* × 'Vera,' Clovelly var. ('Venus' × 'Mona') (votes 12 for, 4 against), from F. Mercer, Esq., Steyning, Sussex. Of an uncommon magenta-rose colour.

To *Dendrobium* × 'Constance Wrigley' var. 'Lady Cicely' ('Lady Colman' × *plumptonense*) (votes 15 for, 1 against), from Baron Bruno Schröder, Englefield Green. Flowers unusually large and well formed, white with purple-flushed tips.

Cultural Commendation.

To Mr. J. Penton, Orchid grower to Mrs. Carl Holmes, for *Cymbidium* × 'Ceres' with a total of 107 flowers.

Other Exhibits.

Messrs. Harry Dixon, Wandsworth : various Orchids.
F. J. Hanbury, Esq., East Grinstead : *Cymbidium* × 'Canberra.'
Messrs. Cowan, Southgate : *Eria ornata*.

May 10, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and ten other members present.

No awards were made on this occasion.

Exhibits.

Messrs. Sanders, St. Albans : *Odontoglossum* hybrids.

Messrs. Black & Flory, Slough : *Miltonia* × 'Mrs. Carl Holmes.'

May 24, 1932 (Chelsea Show), Sir JEREMIAH COLMAN, Bt., in the Chair, and twenty-one other members present.

Awards Recommended :—

First-class Certificate.

To *Sophrolaeliocattleya* × 'Yokohama' var. 'Radiant' (C. × 'Hesperus' × S.-l.-c. × 'Prince Hirohito') (votes unanimous), from Baron Schröder, Englefield Green, Surrey. The spike bore five well-formed flowers of rich salmon-buff colour, the labellum bordered with ruby-crimson.

To *Miltonia* × 'Mrs. J. B. Crum' var. 'Chelsea' ('Lycaena' × 'Princess Mary') (votes unanimous), from R. Paterson, Esq., Ardingly. Spike of three flowers of bright ruby-crimson colour, the labellum having a light brown mask at the base.

To *Cymbidium* × 'Ethel' ('Auriga' × 'Castor') (votes 16 for, 3 against), from Messrs. McBean, Cooksbridge. The spike bore fourteen flowers of clear yellow colour, the lip marked with red.

To *Brassocattleya* × *speciosa* var. *delicata* (C. *Schroederiae* × B.-c. × *Digbyano-Mendelii*) (votes unanimous), from Lionel de Rothschild, Esq., Exbury. Flowers large and showy, pure white, except for some lemon-yellow in the throat of the labellum.

Award of Merit.

To *Dendrobium* × 'Nancy' (*plumptonense* × *Thwaitesiae*) (votes unanimous), from Baron Schröder. The numerous flowers were yellowish, tinged with rose on the sepals and petals, the labellum deeper yellow and with a maroon disc.

To *Miltonia* × *pulchra* ('*Lycaena*' × '*Wm. Pitt*') (votes unanimous), from Baron Schröder. Flowers rich crimson.

To *Laeliocattleya* × '*Model*' var. '*Chelsea*' (C. × '*Enid*' × L.-c. × '*General Maude*') (votes 18 for, 2 against), from R. Paterson, Esq. Flower well-formed, rosy-mauve, much darker in the labellum.

To *Laeliocattleya* × '*Alma*' (C. × '*Helius*' × L.-c. × '*Appam*') (votes unanimous), from Messrs. McBean. Of rich orange colour tinged with salmon, the lip ruby-crimson.

To *Odontoglossum* × '*President Hoover*' var. '*Alpha*' ('*Arcturus*' × '*Prince Imperial*') (votes 20 for, 2 against), from Messrs. McBean. Spike of four flowers, dark crimson with a purple tinge.

To *Cymbidium* × '*Thelma*' var. '*Regina*' ('*Redshank*' × *Alexanderi*) (votes 17 for), from Messrs. Alexander, Tetbury. Spike of eight flowers, ivory-white, the labellum marked with crimson.

To *Cymbidium* × '*Hesperia*' ('*Goosander*' × '*Kittiwake*') (votes unanimous), from Messrs. Alexander. Spike of three white flowers, except for the ruby-coloured labellum.

To *Miltonia* × '*Iver*' ('*Kennie*' × *Sanderiana*) (votes 14 for, 2 against), from Messrs. Black & Flory, Slough. A distinct hybrid with cream-coloured flowers, the petals having a purple base.

To *Rolfeya* × '*Excelsior*' var. '*Model*' (S.-c. × '*S. W. Flory*' × B.-c. × *Cliftonii*) (votes 16 for, 4 against), from Messrs. Stuart Low, Jarvis Brook. Of rosy-mauve colour, the labellum dark purple.

To *Aerides crispum* (votes unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. A fine example of this Indian species.

To *Miltonia* × '*Bruges*' ('*Princess Astrid*' × '*Lycaena*') (votes unanimous), from Messrs. Sanders, St. Albans. Spike of three flowers, bright crimson-red, the labellum with a yellowish base.

To *Lissochilus stylites* var. '*General Chas. Blane*' (votes unanimous), from Sir Jeremiah Colman, Bt., Gatton Park, Surrey. An elegant species from Tropical Africa. The triangular greenish sepals are strongly reflexed, the broad petals and expansive labellum deep rosy-mauve. A peculiar character is the pair of styliform calli on the disc of the labellum.

Cultural Commendation.

To Messrs. Charlesworth, Haywards Heath, for *Angraecum sesquipedale*, with fourteen flowers and buds.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Aerides crispum*, a vigorous plant with a branched inflorescence of nearly a hundred flowers and buds.

June 7, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen other members present.

Awards Recommended:—

Gold Medal.

To Mrs. Carl Holmes, Codicote, Hitchin, Herts, for a group.

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

Banksian Medal.

To Messrs. Sanders, St. Albans, for a group.

Vote of Thanks.

To Messrs. H. G. Alexander, Tetbury, for a group.

First-class Certificate.

To *Odontonia* × '*Olga*' var. '*The Node*' (*Odontonia* × '*Thisbe*' × *Odontoglossum crispum*) (votes 10 for, 1 against), from Mrs. Carl Holmes. Flowers of large size, white, with a blush tint on the sepals, the basal half of the lip brownish-red.

Award of Merit.

To *Trichopilia Backhouseana* (votes unanimous), from Ernest R. Ashton, Esq., Broadlands, Tunbridge Wells. A Colombian plant regarded by some as a form of *T. fragrans*.

To *Odontoglossum* × '*Athenia*' ('*Matador*' × *crispum*) (votes 9 for, 3 against), from Messrs. Charlesworth, Haywards Heath. The spike bore a dozen well-formed large flowers, blush-white with reddish markings.

Cultural Commendation.

To Mr. C. V. Kent, Orchid grower to E. R. Ashton, Esq., Tunbridge Wells, for *Trichopilia Backhouseana*, with twenty-eight flowers.

To The Horticultural College, Swanley, for *Thunia Marshalliana*.

xlvi PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

June 21, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

Award of Merit.

To *Miltonia* × 'Lyona,' Clovelly var. ('Lycaena' × 'Mona') (votes unanimous), from F. Mercer, Esq., Steyning, Sussex. Flowers well-formed, rich rose tinged with crimson.

Cultural Commendation.

To Messrs. Stuart Low, Jarvis Brook, Sussex, for *Brassavola Digbyana*, bearing ten flowers.

Other Exhibits.

Messrs. Stuart Low : various species and hybrids.

Messrs. Harry Dixon, Wandsworth Common : *Ansellia nilotica*.

June 28, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and eight other members present.

Awards Recommended :—

Award of Merit.

Odontoglossum × 'Neron,' Stonehurst var. ('Rosina' × 'Llewellyn') (votes unanimous), from R. Paterson, Esq., Stonehurst, Ardingly, Sussex. The spike bore eight large flowers, soft reddish-brown, the segments tipped with rose.

Other Exhibit.

Sir Jeremiah Colman, Bt., Gatton Park, Surrey : *Dendrobium* × 'Gatton Sunray' [F.C.C. May 29, 1923].

July 5, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and eleven other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

To Messrs. Sanders, St. Albans, for a group.

Award of Merit.

To *Odontoglossum* × 'St. Hilda' (*eximium* × 'crispo-Solon') (votes unanimous), from Messrs. Charlesworth, Haywards Heath. Spike of sixteen large flowers, bluish-white with heavy markings of chocolate colour.

Other Exhibits.

Messrs. Black & Flory, Slough : various hybrid Orchids.

H. P. Lawson, Esq., Lynbrook, Woking : *Renanthera Storiei*.

July 19, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and eleven other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

Award of Merit.

To *Laehocattleya* × 'Cavalese,' Paterson's var. (*L.-c.* × 'Lustre' × *C.* × 'Fabia') (votes 10 for, 3 against), from R. Paterson, Esq., Stonehurst, Ardingly, Sussex. Flowers round, sepals and petals rich rosy mauve, labellum deep purple, with golden venation in the throat.

To *Odontoglossum* × 'Minotaur' var. *ornatum* ('Adula' × 'Clovis') (votes 8 for, 1 against), from Messrs. Charlesworth. Spike of thirteen flowers, of unusually bright magenta-purple, labellum margined with white.

Other Exhibits.

Messrs. Stuart Low : *Selenipedium caudatum*.

R. Paterson, Esq. : *Laehocattleya* × 'President Wilson,' Stonehurst var.

NARCISSUS AND TULIP COMMITTEE.

January 26, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and five other members present.

Exhibit.*Selected for Trial.*

Narcissus 'Precentor' (Division 1a), raised by the Donard Nursery Co. and shown by Major A. A. Dorrien-Smith, Tresco Abbey, Isles of Scilly, was selected for trial.

February 9, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and nine other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To The British Flower Marketing Association for Daffodils and Tulips as packed for market.

Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils and Tulips in bowls.

Other Exhibits.

Messrs. Wakeley, Bankside, S.E. 1 : Daffodils and Tulips.

Apparatus to assist Fluids to penetrate Bulbs.

After the ordinary business the Committee witnessed a demonstration given by Mr. H. G. Longford with an apparatus which he had designed to extract air from bulbs and corms so as to allow of fluids penetrating the tissues. Mr. Longford was hopeful that the apparatus would enable one to destroy eelworms, the larvæ of flies and the resting bodies of some fungi without damage to the plants, and he very kindly offered to arrange for an apparatus to be sent to Wisley for experiment.

The Chairman, on behalf of the Committee, thanked Mr. Longford for the demonstration, and on behalf of the Council he accepted with thanks the offer of the apparatus for experimental use.

February 23, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.H.M., in the Chair, and thirteen other members present.

Awards Recommended :—*Award of Merit.*

To *Narcissus* 'St. Martin' as a variety for cutting (votes 9 for). An *incomparabilis* variety (Division 2a) with a primrose-yellow perianth and rather narrow and pointed inner segments. The corona, which was just over half the length of the perianth segments, was orange, passing to golden-yellow at the base. Raised and shown by Mr. P. D. Williams, Lanarth, St. Keverne, Cornwall, who had gathered the blooms from the open where they were grown without protection.

Selected for Trial.

Narcissus 'St. Martin,' shown by Mr. P. D. Williams, was selected for trial as a variety for garden decoration and as a variety for cutting from the open.

A pretty hybrid between *N. cyclamineus* and *N. minimus* which had occurred in Sir Frederick Moore's garden at Willbrook House, Rathfarnham, co. Dublin, was shown by Lady Moore and selected for trial as a variety for the rock garden.

Other Exhibits.

Carters' Tested Seeds, Raynes Park : Tulips and Daffodils.

Messrs. R. H. Bath, Wisbech : Tulips and Daffodils.

Mr. H. Hanchet, South Nutfield, Surrey : Daffodils.

March 8, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.H.M., in the Chair, and eleven other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Mr. J. L. Richardson for Daffodils.

Silver Banksian Medal.

To Messrs. J. R. Pearson, Lowdham, for Daffodils in bowls.

I PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Award of Merit.

To *Narcissus* 'Aabenraa' as a variety for exhibition (votes 8 for). An *incomparabilis* variety (Division 2a) with clear yellow, broad, overlapping perianth segments, and an orange cup about half the length of the perianth segments. Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson, Prospect House, Waterford.

Other Exhibits.

Messrs. D. Stewart, Wimborne: Daffodils.

Apparatus to assist Fluids to penetrate Bulbs.

Mr. H. G. Longford sent for the Committee's inspection a later and improved model of the apparatus which he exhibited on February 9. The new model was fitted with two pumps, one for extracting air and the other for forcing air into the bottle. The Secretary was instructed to thank Mr. Longford.

March 22, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:—

Silver-gilt Banksian Medal.

To Mr. J. L. Richardson, Prospect House, Waterford, for Daffodils.

Silver Banksian Medal.

To Mr. R. F. Calvert, Coverack, Cornwall, for Daffodils.

To Carters' Tested Seeds, Raynes Park, for Daffodils.

To the Donard Nursery Company, Newcastle, co. Down, for Daffodils.

To Mr. Guy L. Wilson, Broughshane, co. Antrim, for Daffodils.

Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

Award of Merit.

To *Narcissus* 'Honeydew' as a variety for exhibition (votes 8 for, 3 against). A refined trumpet variety (Division 1a) with broad, smooth, overlapping, primrose-yellow perianth segments and a rather narrow chrome-yellow trumpet, about the same length as the perianth segments, with a reflexed, crimped margin. Raised and shown by Messrs. Barr.

Discussion on Yellow Stripe of Daffodils.

Mr. P. D. Williams said that he understood on good authority that the disease of daffodils known as "Yellow Stripe" was spreading to an alarming extent throughout the country, and suggested that arrangements should be made for the Committee and any other people who had studied the disease to have a discussion on it.

Mr. Secrett spoke in support of Mr. Williams's suggestion and said that he had observed the disease to be very prevalent in cultures in different places.

It was decided that a special meeting of the Committee should be held in the Lecture Room at 12 noon on April 5 to discuss the matter, and the Secretary was requested to invite all specialists and research workers who were known to be interested in the subject.

It was proposed by Mr. Curtis, seconded by Mr. Richardson, and unanimously carried, that the Chairman request the Council to arrange for an investigation of the disease to be carried out at Wisley.

April 5, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and seventeen other members present.

Awards Recommended:—

Gold Medal.

To Mr. J. L. Richardson, Prospect House, Waterford, for Daffodils.

Silver-gilt Banksian Medal.

To Messrs. Barr, King Street, Covent Garden, for Daffodils.

To Mr. R. F. Calvert, Coverack, Cornwall, for Daffodils.

Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils.

Award of Merit.

To *Narcissus* 'Penwith' as a variety for exhibition (votes 15 for). A well-formed, stout-stemmed, bicolour *incomparabilis* variety (Division 2b) with broad, smooth, white but rather thin perianth segments, and a pale yellow-ochre, tubular corona nearly three-quarters as long as the perianth segments. Raised by the Brodie of Brodie and shown by Mr. A. F. Calvert.

To *Narcissus* 'Penquite' as a variety for exhibition (votes 12 for). A fairly large, stout-stemmed *incomparabilis* variety (Division 2a) with broad, smooth, deep primrose perianth segments, and a self-coloured, orange, broad,

funnel-shaped cup rather less than half the length of the perianth segments. Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson.

To *Narcissus* 'Niphetos' as a variety for exhibition (votes 10 for). A *Leedsii* variety (Division 4a) with very broad, creamy-white, perianth segments, and a wide-mouthed trumpet nearly three-quarters as long as the perianth segments, with a slightly reflexed and frilled margin, very pale yellow at first, becoming creamy-white. Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson.

To *Narcissus* 'Diolite' as a variety for exhibition (votes 14 for). A very large *incomparabilis* variety (Division 2a) with long stout stems. The broad, smooth, overlapping, primrose-yellow perianth segments had a spread of well over four-and-a-quarter inches, and the cup, which was about two-fifths the length of the perianth segments, was golden-yellow, edged bright orange, and slightly frilled at the margin. Raised by Miss G. Evelyn and shown by Mr. J. L. Richardson.

To *Narcissus* 'Crackrattle' as a variety for exhibition (votes 14 for). A rather small but dainty and well-formed *incomparabilis* variety (Division 2a) with smooth, deep-primrose perianth segments and a reddish-orange cup, self-coloured inside and out, and about two-fifths the length of the perianth segments. Raised and shown by Mr. P. D. Williams, Lanarth, St. Keverne.

To *Narcissus* 'Sunray' as a variety for exhibition (votes 14 for) and as a variety for cutting (voting unanimous). A bright, medium-sized *incomparabilis* variety (Division 2a) with clean-cut flowers of good substance. The deep-primrose perianth segments were broad, rounded and smooth, and the neat cup was about half the length of the perianth segments, and reddish-orange passing to golden-yellow at the base. Raised and shown by Mr. P. D. Williams.

Selected for Trial.

Narcissus 'Crackrattle,' shown by Mr. P. D. Williams, was selected for trial as a variety for garden decoration and for cutting from the open for market.

Other Exhibits.

The Buckland Flower Farm, Kingsbridge: Daffodils.

Messrs. D. Stewart, Ferndown: Daffodils.

Yellow Stripe Disease of Daffodils.

At 12 noon the Committee reassembled for a discussion on the Yellow Stripe Disease of Daffodils. A number of research workers and others who had been invited to attend, took part in the discussion. It appeared that the disease probably belongs to the group known as virus diseases, but that proof is still wanting. Dr. Pethybridge and others felt that much careful work was needed in order to determine the symptoms so that the disease may be readily distinguished from other conditions in which yellow stripes occur. Work was also needed to ascertain what organism carries the virus from plant to plant. Mr. Secrett very kindly offered to place land at the disposal of the Society for the investigation of the disease, and he was thanked by the Chairman, who said that Mr. Secrett's generous offer would be kept in mind by Sir Daniel Hall and the other members of a Committee appointed by the Council to advise upon the scientific work to be undertaken by the Laboratory staff at Wisley.

April 14, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and twenty other members present.

Death of Mr. J. D. Pearson.

It was resolved that the Secretary convey to Mrs. J. D. Pearson the deep sympathy of the Committee in the loss she has sustained in the death of her husband who was for many years a member of the Committee.

Awards Recommended:—

Gold Medal.

To Messrs. Barr, Covent Garden.

To Mr. J. L. Richardson, Prospect House, Waterford.

To Messrs. F. Rynveld, Hillegom, Holland.

Silver-gilt Flora Medal.

To the Donard Nursery Company, Newcastle, co. Down.

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Wisbech.

To Mr. R. F. Calvert, Coverack, Cornwall.

To Mr. Guy L. Wilson, Broughshane, co. Antrim.

Silver Flora Medal.

To Messrs. Dobbie, Edinburgh.

To Mr. R. D. Wellband, Spalding.

Silver Banksian Medal.

To Messrs. J. R. Pearson, Lowdham.
To Messrs. D. Stewart, Wimborne.
To Messrs. Wakeley, Bankside, S.E. 1.

Flora Medal.

To The Earl of Darnley, Cobham Hall, Kent.

Banksian Medal.

To Messrs. H. Prins, Wisbech.
To Mr. J. C. Martin, Bosvigo Gardens, Truro.

Award of Merit.

To *Narcissus* 'Indus' as a variety for exhibition (votes 12 for, 3 against). A very refined *incomparabilis* variety (Division 2a) with very smooth, primrose-yellow perianth segments and a chrome-yellow trumpet about seven-eighths the length of the perianth segments and indented at the margin. Raised by Sir Charles Cave and shown by Messrs. Barr.

To *Narcissus* 'Trevisky' as a variety for exhibition (votes 16 for). A stout-stemmed *incomparabilis* variety (Division 2a) with very smooth, primrose-yellow perianth segments and a self-coloured, reddish-orange corona which was cup-shaped, without a frill, and about three-sevenths the length of the perianth segments. Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson.

To *Narcissus* 'Inverness' as a variety for exhibition (votes 15 for). An attractive *incomparabilis* variety (Division 2a) with long stout stems. The broad, rounded perianth segments were very pale sulphur-yellow, and the funnel-shaped corona, which was rather more than two-fifths the length of the perianth segments, was orange-yellow passing to yellow at the base. Raised by the Brodie of Brodie and shown by Mr. J. L. Richardson.

To *Narcissus* 'Forfar' as a variety for exhibition (votes 15 for). A bicolour *Barrii* variety (Division 3b) with long wiry stems. The broad, rounded, smooth perianth segments were very pale sulphury-white, and the dish-shaped corona, which was nearly one-third the length of the perianth segments, was self-coloured reddish-orange. Raised by the Brodie of Brodie and shown by Mr. J. L. Richardson.

To *Narcissus* 'Askelon' as a variety for exhibition (votes 12 for). A white trumpet variety (Division 1b) with very broad, smooth, creamy-white perianth segments and a bold, bell-mouthed, cream-coloured trumpet. Raised by the Brodie of Brodie and shown by Mr. Guy L. Wilson.

Preliminary Commendation.

To *Narcissus* 'Trenoon' (votes 11 for). An *incomparabilis* variety (Division 2a) with a long stout stem. The pale chrome-yellow perianth segments were broad and smooth, and the buttercup-yellow trumpet, which had a reflexed rim, was four-fifths the length of the perianth segments. Raised by Mr. P. D. Williams and shown by Mr. J. L. Richardson.

Other Exhibits.

Major H. F. Fletcher, St. Asaph: Daffodils.
Mr. H. Hanchet, South Nutfield: Daffodils.
Mr. H. G. Longford, Abingdon: Daffodils.
Mr. Peter Lower, Harpenden: Daffodils.
Mr. A. Watts, St. Asaph: Daffodils.
Messrs. John Wilson, Hereford: Daffodils.

The Peter Barr Memorial Cup.

It was unanimously recommended that the Peter Barr Memorial Cup be awarded to Mr. W. B. Cranfield.

April 26, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and sixteen other members present.

Awards Recommended:—

Gold Medal.

To Mr. F. A. Secrett, Twickenham, for Daffodils.

Silver-gilt Banksian Medal.

To Messrs. Barr, Covent Garden, for Daffodils.

Silver Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Daffodils.
To Mr. R. F. Calvert, Coverack, Cornwall, for Daffodils.
To Messrs. J. R. Pearson, Lowdham, for Daffodils.

Award of Merit.

To *Narcissus* 'Red Defiance' as a variety for cutting (votes 12 for). A striking large-flowered, stout-stemmed, *incomparabilis* variety (Division 2a) with primrose-

yellow perianth segments and an orange cup about three-fifths the length of the segments. Raised and shown by Messrs. R. H. Bath.

Selected for Trial.

Narcissus 'Red Defiance,' shown by Messrs. R. H. Bath, was selected for trial as a variety for garden decoration, and as a market variety for cutting from the open.

Other Exhibits.

Daffodils and Tulips from Messrs. D. Stewart, Ferndown.

Daffodils from Messrs. Wakeley, Bankside, S.E. 1.

May 10, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and fourteen other members present.

Yellow Stripe Disease of Daffodils.

The Council having submitted to the Committee the report of a committee appointed to go into the matter of the investigation of the Yellow Stripe Disease of Daffodils, the position was reconsidered, and it was recommended that the question of whether funds should be raised for an investigation be deferred until next year.

Daffodil Year-book.

It was unanimously recommended that the Council consider the advisability of reviving the Daffodil Year-book.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Messrs. A. C. van der Schoot, Hillegom, Holland, for Tulips.

Silver Banksian Medal.

To Messrs. Barr, Covent Garden, for Tulips and Daffodils.

Banksian Medal.

To Mr. R. D. Wellband, Spalding, for Tulips.

First-class Certificate.

To *Narcissus* 'Papyrus' as a variety for cutting (votes 9 for). This *poeticus* variety received an Award of Merit as a variety for cutting and market on April 13, 1926 (see JOURNAL, vol. 52, p. lxxv). Shown by Mr. F. A. Secrett, Twickenham.

Preliminary Commendation.

To Tulip 'Wildlust' (votes 10 for). A large white Cottage Tulip raised by Messrs. J. J. Grullemans and shown by Messrs. A. C. van der Schoot.

To Tulip 'G. W. Leak' (votes unanimous). A large Cottage Tulip with geranium-like segments and a yellow base. Raised by Messrs. C. G. van Tubergen and shown by Messrs. A. C. van der Schoot.

Other Exhibits.

Daffodils and Tulips from Messrs. D. Stewart, Ferndown.

May 24, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and ten other members present.

Exhibit.

One Tulip was submitted to the Committee, but no award was recommended.

AWARDS TO SUNDRIES, 1931-2.

SPRAYING APPARATUS.

Award of Merit.

- † Vermorel "Hydra" Sprayer, from Messrs. Cooper, Pegler, 24, Christopher St., London, E.C.
- † Vermorel Headland Spray Pump, from Messrs. Cooper, Pegler.
- * "Cascade" Sprayer, from Messrs. Cooper, Pegler.

Highly Commended.

- * "Ferret" Shaker Bellows for applying dust sprays, from Messrs. W. J. Craven, Evesham.
- † "Noe-Leo" Pneumatic Knapsack Sprayer, from Messrs. Cooper, Pegler.
- † "Waldron" Powder Distributor, from Messrs. Robinson Bros., West Bromwich.

Commended.

- † The "Fog" Sprayer, from Messrs. Cooper, Pegler.
- † The "Sem" Pneumatic Knapsack Sprayer, from Messrs. Cooper, Pegler.

VARIOUS APPARATUS, ETC.

Award of Merit.

- * "Grange" Killweeder, from P. Carmichael, 64, Grange Road, Balham.
- * Lawn Sprinkler, from Mr. Brickhill, Savoy House, Strand, W.C.
- * Border Sprinkler, from Mr. Brickhill.

Highly Commended.

- * Serpent Labels, from The Serpent Label Co., 31, Elizabeth St., S.W.
- * Galvanized Trug, from Messrs. Slaymaker, 25, Catherine St., London, E.C.
- † "Greffex" binding tape for grafting and budding, from Messrs. Monro, Waltham Cross.

Commended.

- * Wall Nails with detachable lead heads.
 - * Lead Wire Ribbon.
 - * Lead Labels for trees with wire attachment.
 - * Lead Labels for pots.
- All from Messrs. Lane, Newchurch St., Bermondsey.

SPRAYING MATERIALS.

Award of Merit.

- * "Anti-pest" for aphides and young caterpillars and sawflies (non-poisonous), from Messrs. W. Wood, of Taplow.
- * Carlton Arsenate of Lead Paste for leaf-eating insects, from Messrs. Voss & Co., Millwall, London.
- † "Apo" Fruit Wash for aphides and Psylla on fruit trees, from Messrs. Voss.

Highly Commended.

- * Pyrethrum Powder for use against woodlice, from Messrs. Monro.
- * "Rustica Talus" Insecticide for painting dormant trees against scale and insect eggs, from Mr. R. J. Hall, 11, Queen Victoria St., London.
- † Lethalate Lead Arsenate (colloidal) for leaf-eating insects, from Lunevale Products, Ltd.

BOOKS AND PAMPHLETS PRESENTED, PURCHASED OR REVIEWED DURING THE HALF-YEAR ENDING JUNE 30, 1932, AND DEPOSITED IN THE LIBRARY.

- 1 = Sent for Review.
 2 = Purchased.
 3 = Presented by the Author.
 4 = " " Sir Arthur Smith Woodward.
 5 = " " Miss A. C. Bryson.
 6 = " " Mr. F. J. Chittenden.
 7 = " " Mr. W. Roberts.
 8 = " " Mr. G. E. Young.
 9 = " " Miss A. F. Man.
 10 = " " Major G. Churcher.
 11 = " " Sir A. Daniel Hall.
 12 = " " Mr. Lionel de Rothschild.

Abbreviations.—Col. pls. = coloured plates; illus. = illustrated; rev. = revised; pls. = plates; ed. = editor, edited or edition; n.d. = no date; n.p. = no place (of publication given).

When books are published in London, the place of publication is not named in the entry.

- Allen, Grant.** The story of the plants. New ed., fully rev. and annotated, and with a biography of the author by MARCUS WOODWARD. Illus. 8vo. n.d. [1926.] (1)
- Alpine.** Deuxième congrès des jardins alpins tenu à Pont-de-Nant (Vaud) le 6 août, 1907. 8vo. [Geneva,] 1907. (2)
- Alpino, Prospero.** Rerum Aegyptiarum libri quatuor opus postumum nunc primum . . . editum . . . Illus. sm. 4to. Leyden, 1735. (2)
- De plantis Aegypti . . . dissertatio ejusdem de Laserpitio, et Loto Aegyptia. Cum observationibus et notis J. VESLINGII . . . accedunt ejusdem J. VESLINGII paraeneses ad rem herbariam et vindiciae Opobalsami cum indicibus necessariis. Illus. sm. 4to. Leyden, 1735. (2)
- Ames, Oakes.** A contribution to our knowledge of the orchid flora of Southern Florida. (Contr. Ames Bot. Lab. no. 1.) Illus. 8vo. Cambridge, Mass., 1904. (2)
- Notes on Philippine orchids with descriptions of new species. 1-3. (Philipp. Journ. Sci., Sect. C. Bot. iv & vi.) 8vo. Manila, 1909-1911. (2)
- Schedulae orchidianae. Nos. 1-5. Illus. 8vo. Boston, Mass., 1923. (2)
- An essay on the different natural situations of gardens.** See GARDENS.
- André, R. Ed.** See SAINT-SAUVEUR, H.
- Anthologia Magna.** See BRY, J. T. DE.
- Baker, E. G.** New Leguminosae from the Belgian Congo. (Rev. Zool. Bot. Afr. xxi.) 8vo. Ghent, 1932. (3)
- Bartonia.** Proceedings of the Philadelphia Botanical Club. Special issue. An account of the two hundredth anniversary of the founding of the first botanic garden in the American Colonies by JOHN BARTRUM. 8vo. Philadelphia, 1931.
- Bartrum, John.** Founding of the first botanic garden in the American Colonies. See BARTONIA.

- Beale, E. J.** [*Ed.*]. *CARTERS' practical gardener* . . . 11th ed. Illus. 8vo. 1881.
- Bear, P. K.** *Simple fruit growing*. Ed. by A. J. MACSELF. Illus. 8vo. n.d. [1931 ?] (1)
- Berger, Alwin.** *Kakteen. Anleitung zur Kultur und Kenntnis der wichtigsten eingeführten Arten*. Illus. 8vo. Stuttgart, 1929. (2)
- Blanck, E.** [*Ed.*]. *Handbuch der Bodenlehre*. Vol. 10. 8vo. Berlin, 1932. (2)
- Bloudeau, Henri.** *La domiculture. Nouvelle méthode de culture intensive des plantes en appartements*. 8vo. Paris, 1896. (2)
- Branas, M.** *La roussure des producteurs directs*. (Ann. École Nat. Agr. Montp. xx.) Illus. 8vo. Montpellier, 1930.
- Brand, A.** *Borraginaceae-Borraginoideae-Cryptanthaeae*. See ENGLER, A. *Das Pflanzenreich*, 97.
- Brewer, James Alexander.** *A new flora of the neighbourhood of Reigate, Surrey*. Map. 8vo. 1856. (2)
- British Garden, The** : a descriptive catalogue of hardy plants, indigenous or cultivated in the climate of Great Britain . . . 2 vols. 8vo. Bath, 1799. (2)
- [Bry, Johann Theodor de.]** *Anthologia magna, sive florilegium novum et absolutum*. . . . Col. pls. fol. Frankfurt, 1626. (2)
- Buck, Margaret Warriner.** Illus. See PARSONS, M. E. *Wild flowers of California*.
- Buisman, Christine.** *Übersicht über die Ulmenarten in Bezug auf den Kampf gegen die Ulmenkrankheit*. (Angewandte Bot. xiii.) 8vo. n.p. 1931.
- Bukinich, D. D.** See VAVILOV, N. I. *Agricultural Afghanistan*.
- Callmar, Gunnar.** *Några erfarenheter rörande plommon vid Experimentalfältets trädgårdsavdelning*. (Sv. Pom. Förenings Årsskrift.) Col. pl. 8vo. Stockholm, 1931.
- Cambridge. Imperial Bureau of Plant Genetics** (for Crops other than Herbage). *Plant breeding abstracts*. Vol. i. 8vo. Cambridge, 1931.
- Account of the research in progress in the British Empire. 8vo. Cambridge, 1932.
- Interspecific and intergeneric hybridization in relation to plant-breeding. 8vo. Cambridge, 1932.
- Cardot, J.** *Rosacées nouvelles d'extrême-orient*. (Lecomte, Not. Syst. iii, n. 9, 10, 11, 12 ; iv, n. 1.) 8vo. Paris, 1916-20. (2)
- China. Science Society.** See NANKING.
- Chiovenda, Emilio.** *Flora Somala*. Illus. 8vo. Rome, 1929. (4)
- Comber, Norman M.** *An introduction to the scientific study of the soil*. 8vo. 1927. (1)
- Corrêa, M. Pio.** *Diccionario das plantas uteis do Brasil e das exóticas cultivadas*. Vol. 2. Illus. 1a. 8vo. Rio de Janeiro, 1931. (2)
- Cox, E. H. M.** *The gardener's chapbook*. Illus. 8vo. 1931. (1)
- Debeaux, J. Odon.** *Flore de la Kabylie du Djurdjura*. (Rev. Bot. 1893-94.) 8vo. Paris, 1894. (2)
- Dell' arte dei giardini Inglesi.** See ENGLISH GARDENS.
- Dillwyn, L. W.** *Hortus Collinsonianus*. 8vo. Swansea, 1843. (2)
- Don, D.** See ORNAMENTAL FLOWER GARDEN AND SHRUBBERY.
- Druery, C. T.** *Choice British ferns: their varieties and culture*. Illus. 8vo. 1888. (5)
- Du Petit-Thouars, L. M. Aubert.** *Recueil de rapports et de mémoires sur la culture des arbres fruitiers* . . . 8vo. Paris, 1815. (2)
- Durante, Castore.** *Herbario nuovo. Con figure che rappresentano le vive piante, che nascono in tutta Europa, e nell' Indie orientali, e occidentali*. Illus. fol. Venice, 1718. (2)

- East Malling. Imperial Bureau of Fruit Production.** Technical communication No. 2. Field experiments in horticulture, by T. N. HOBLYN. 8vo. East Malling, 1931.
- Horticultural abstracts. Vol. i. 8vo. East Malling, 1931. (2)
- Empire Marketing Board.** See LONDON.
- Engler, A.** Das Pflanzenreich.
97. BRAND, A. Borraginaceae. (2)
98a, 98b. RADLKOFER, L. Sapindaceae I, II. 1932. (2)
- English Gardens.** Dell' arte dei giardini Inglesi. Illus. 4to. Milan, [1868]. (2)
- Faes, H., & Staehelin, M.** L'apparition et le développement de la tavelure tardive sur les pommes de garde. (Ann. Agricole Suisse, 1931.) Illus. 8vo. Berne, 1931. (3)
- Fikry, M. A.** Natural crossing in cotton. (R. Agr. Soc. Egypt, Tech. Sect., Bull. 18.) 8vo. Cairo, 1931.
- Fisher, Edith R.** The garden club manual. Illus. 8vo. New York, 1931. (1)
- Från Blomstergården.** Utgiven av Blomsterodlingens vänner i Finland. Vols. 1-3. Illus. 8vo. Helsingfors, 1925-31.
- Franquet, R.** See GUILLAUMIN, A. Arbres et arbrisseaux.
- Garden Design.** Ed. by PERCY S. CANE. No. 9. Illus. 4to. 1932.
- Gardener, Florist and Agriculturist, The.** Nos. 1-26. Illus. fol. 1847. (2)
- Gardens.** An essay on the different natural situations of gardens. 4to. 1774. (2)
- Godfrey, Blanche Lee.** Gold from your garden. Intensive production for the smallholder. Illus. 8vo. [1932.] (3)
- Guillaumin, A., & Franquet, R.** Arbres et arbrisseaux utiles ou ornementaux. 8vo. Paris, 1927. (2)
- Herter, Guillermo.** Estudios botánicos en la región Uruguaya. Florula Uruguayensis. Plantae vasculares. Col. pls. Illus. 8vo. Montevideo, 1930. (6)
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- Hoblyn, T. N.** Field experiments in horticulture. See EAST MALLING. IMPERIAL BUREAU OF FRUIT PRODUCTION.
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EXTRACTS FROM THE PROCEEDINGS

OF THE

ROYAL HORTICULTURAL SOCIETY.

GENERAL MEETINGS.

AUGUST 23, 1932.

FOREMARKE CHALLENGE CUP COMPETITION.

The Foremarke Challenge Cup, for twenty spikes of named Gladioli in not less than 10 varieties, was awarded to Mr. W. E. Phillips, 52 Clarence Road, Wood Green, N.

SEPTEMBER 6, 1932.

BRITISH GROWN BULBS.

AWARDS FOR EXHIBITS OF BRITISH GROWN BULBS.

Gold Medal.

To Messrs. Seymour Copley, Spalding.

Silver Banksian Medal.

To Messrs. R. H. Bath, Wisbech.

To the Devon County Agricultural Committee.

Banksian Medal.

To Messrs. Wakeley Bros., London.

A lecture was given by Mr. R. L. Harrow, V.M.H., on "Some New and Interesting Introductions to Horticulture."

Chairman, Major F. C. Stern, O.B.E., M.C., F.L.S.

SEPTEMBER 20-21, 1932.

AUTUMN SHOW—OPEN-AIR PLANTS AND ROSES.

AWARDS.

The Coronation Cup, for the best exhibit in the show other than Roses.

To Messrs. Dobbie, Edinburgh, for Dahlias.

The Wigan Cup, for the best exhibit of Roses.

To Messrs. S. McGredy, Portadown, Ireland.

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Messrs. Dickson & Robinson, Manchester, for Dahlias.

To Messrs. Dobbie, Edinburgh, for Dahlias.

To Messrs. S. McGredy, Portadown, Ireland, for Roses.

To Messrs. Alex. Dickson, Newtownards, for Roses.

Silver-gilt Flora Medal.

To Messrs. Chaplin Bros., Waltham Cross, for Roses.

To Mr. J. W. Forsyth, Putteridge, for early-flowered Chrysanthemums.

To Mr. Stuart Ogg, Swanley, for Dahlias.

To Messrs. M. Prichard, Christchurch, for herbaceous plants.

To Messrs. J. Waterer, Sons & Crisp, Twyford, for Roses.

lxii PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

Silver-gilt Banksian Medal.

To Messrs. R. H. Bath, Wisbech, for Gladioli.

To Messrs. Benjamin R. Cant, Colchester, for Roses.

To Messrs. J. Cheal, Crawley, for mixed group of herbaceous plants and Dahlias.

To Messrs. Dowty's Rosery, Wokingham, for Roses.

To Mr. S. J. Goodliffe, Bishops Stortford, for mixed group of Michaelmas Daisies, Dahlias, and Phloxes.

To Messrs. Keith Luxford, Sawbridgeworth, for early-flowering Chrysanthemums.

To Messrs. W. T. & H. E. Neale, Newhaven, for Cacti and succulents.

To Mr. G. Prince, Longworth, for Roses.

To Mr. J. B. Riding, Chingford, for Dahlias.

To Messrs. J. Waterer, Sons & Crisp, Twyford, for mixed group of herbaceous plants and Dahlias.

To Mr. J. T. West, Tower Hill, Brentwood, for Dahlias.

Silver Flora Medal.

To Messrs. Baker, Codsall, for herbaceous plants.

To Messrs. Barr & Sons, Covent Garden, for Montbretias and other herbaceous plants.

To Mr. T. Bones, Cheshunt, for Michaelmas Daisies.

To Messrs. Carter Page, London Wall, for Dahlias.

To Mr. Henry Drew, Longworth, for Roses.

To Mr. Elisha J. Hicks, Twyford, for Roses.

To Messrs. I. House, Bristol, for mixed group of Kniphofias, Scabious, Gaillardias and other herbaceous plants.

To Messrs. Jarman, Chard, Somerset, for Dahlias.

To Messrs. H. J. Jones, Lewisham, for mixed group of early-flowering Chrysanthemums, Michaelmas Daisies, and herbaceous plants.

To Mr. Ernest Ladhams, Godalming, for herbaceous plants.

To Messrs. H. C. Lawrence, Chatham, for early-flowering Chrysanthemums.

To Mr. James MacDonald, Harpenden, for grass garden.

To Mr. Amos Perry, Enfield, for water and water-side plants.

To Mr. Thos. Robinson, Nottingham, for Roses.

To Messrs. T. Smith, Stranraer, for Roses.

To Messrs. J. Stredwick, St. Leonards, for Dahlias.

To Mr. A. G. Vinten, Balcombe, for early-flowering Chrysanthemums.

To Mr. W. Wells, jun., Merstham, for herbaceous plants.

To Messrs. Wm. Wood, Taplow, for herbaceous plants.

To Mr. H. Woolman, Birmingham, for Dahlias.

Silver Banksian Medal.

To Messrs. Allwood Bros., Haywards Heath, for Border Carnations and Pinks.

To Mr. W. E. B. Archer & Daughter, Sellinge, for Roses.

To Messrs. Frank Cant, Colchester, for Roses.

To Messrs. W. Cutbush, Barnet, for early-flowering Chrysanthemums.

To Messrs. W. Easlea, Leigh-on-Sea, for Roses.

To Messrs. John Forbes, Hawick, for Phloxes and Pentstemons.

To Messrs. Hewitt, Solihull, for herbaceous plants.

To Messrs. Hillier, Winchester, for water and water-side plants.

To Mr. A. Gavin Jones, Letchworth, for herbaceous plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Mr. R. Murrell, Shepperton, for Roses.

To Messrs. D. Prior, Colchester, for Roses.

To Messrs. A. Reeves, Norwich, for Roses.

To Messrs. L. R. Russell, Richmond, for water, water-side and rock-garden plants.

To Messrs. A. Warner, Colchester, for Roses.

Lindley Medal.

To Mr. A. Hanson, New Barnet, for Sempervivums.

Flora Medal.

To Mr. R. Carlile, Twyford, for herbaceous plants.

To Messrs. G. & A. Clark, Dover, for herbaceous and bulbous plants.

To Messrs. Clarence Elliott, Stevenage, for rock-garden plants.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Messrs. Maxwell & Beale, Broadstone, Dorset, for rock-garden plants.

To Messrs. M. Prichard, Christchurch, for rock-garden plants.

To Messrs. Redgrove & Patrick, Sevenoaks, for herbaceous plants and Dahlias.

To Messrs. W. H. Rogers & Son, Southampton, for rock-garden plants.

To Messrs. R. Wallace, Tunbridge Wells, for mixed group of Lilies and other bulbous plants.

To Mr. W. Yandell, Maidenhead, for Chrysanthemums and Violas.

Banksian Medal.

To Messrs. Bentall, Romford, for Roses.

To Messrs. A. A. Buckwell, St. Mary Cray, for early-flowering Chrysanthemums.

To Messrs. G. Bunyard, Maidstone, for Michaelmas Daisies and herbaceous plants.

To Mr. W. A. Constable, Paddock Wood, for Lilies.

To Messrs. G. Gibson, Leeming Bar, for rock-garden and herbaceous plants.

To Messrs. Gibson & Amos, Cranleigh, for Gladioli, Dahlias, Kniphofias and Lilies.

To Mr. W. E. Th. Ingwersen, East Grinstead, for rock-garden plants.

To Messrs. Kelways, Langport, for Gladioli and herbaceous plants.

To Messrs. B. Ladhams, Southampton, for herbaceous plants.

To Messrs. H. Langridge, Westerham, for Dahlias.

To Messrs. Laxton Bros., Bedford, for Roses.

To The Marsden Hardy Plant Nursery, Ashted, for rock-garden and herbaceous plants.

To Mr. John Mattock, Headington, for Roses.

To Messrs. Neale Bros., Solihull, for Dahlias.

To Messrs. W. T. & H. E. Neale, Newhaven, for Gazanias.

To Messrs. G. Reuthe, Keston, for rock-garden and herbaceous plants.

To Messrs. Rich & Cooling, Bath, for herbaceous plants and Dahlias.

To Messrs. J. Robinson & Son, New Eltham, for rock-garden and herbaceous plants.

To Mr. G. E. Welch, Cambridge, for rock-garden plants.

To Mr. W. Wells, jun., Merstham, for rock-garden plants.

The Sewell Medal for the best exhibit of six pots or pans of plants suitable for the rock-garden or alpine house was awarded to Mr. G. P. Baker, Sevenoaks.

A lecture was given, on September 20, by Mr. T. Stevenson, on "Early-flowering Chrysanthemums."

Chairman, the Hon. Sir John Ward, K.C.V.O. (see p. 94).

AUTUMN SHOW—TREES AND SHRUBS.

SEPTEMBER 27-28, 1932.

AWARDS.

Silver-gilt Flora Medal.

To Messrs. Carter Page, London Wall, for Dahlias.

To Messrs. R. Wallace, Tunbridge Wells, for trees and shrubs.

Silver-gilt Banksian Medal.

To Messrs. Alex. Dickson, Newtownards, for Roses.

To Messrs. Dobbie, Edinburgh, for mixed group of Gladioli and Violas.

To Messrs. Hillier, Winchester, for trees and shrubs.

To Messrs. Maxwell & Beale, Broadstone, for Heaths and other shrubs.

To Mr. Stuart Ogg, Swanley, for Dahlias.

To Mr. Amos Perry, Enfield, for aquatic and water-side plants.

To Mr. J. B. Riding, Chingford, for Dahlias.

To Messrs. L. R. Russell, Richmond, for Clematis and ornamental vines.

To Messrs. J. Waterer, Sons & Crisp, Bagshot, for trees and shrubs.

Silver-gilt Hogg Medal.

To Mr. J. C. Allgrove, Langley, for fruit trees and gathered fruit.

Silver Flora Medal.

To Mr. T. Bones, Cheshunt, for Michaelmas Daisies.

To Messrs. Chaplin Bros., Waltham Cross, for Roses.

To Messrs. J. Cheal, Crawley, for shrubs and Conifers.

To Messrs. J. Cheal, Crawley, for Dahlias.

To The Donard Nursery Co., Newcastle, co. Down, for shrubs.

To Messrs. Dowty's Rosery, Wokingham, for Roses.

To Mr. J. W. Forsyth, Putteridge, for Chrysanthemums.

To Mr. Elisha J. Hicks, Twyford, for Roses.

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To Messrs. Jarman, Chard, for Dahlias.

To Mr. W. J. Marchant, Wimborne, for trees and shrubs.

To Mr. R. C. Notcutt, Woodbridge, for shrubs.

To Messrs. G. Reuthe, Keston, for shrubs.

To Mr. W. Wells, jun., Merstham, for Michaelmas Daisies and other herbaceous plants.

To Mr. H. Woolman, Birmingham, for Dahlias.

To Mr. J. T. West, Brentwood, for Dahlias.

Silver Banksian Medal.

To Messrs. Allwood Bros., Haywards Heath, for Carnations.

To Mr. Ernest Ballard, Malvern, for Michaelmas Daisies.

To Messrs. Barr, Covent Garden, for Michaelmas Daisies and Autumn Crocuses.

To Messrs. Benjamin R. Cant, Colchester, for Roses.

To Messrs. C. Engelmann, Saffron Walden, for Carnations.

To Mr. S. J. Goodliffe, Bishops Stortford, for mixed group of shrubs, herbaceous plants and Dahlias.

To Mr. H. Hemsley, Crawley, for trees and shrubs.

To Mr. Ernest Ladhams, Godalming, for shrubs.

To Messrs. E. C. Lawrence, Chatham, for Chrysanthemums.

To Mr. John Mattock, Headington, for Roses.

To Mr. R. Murrell, Shepperton, for Roses.

To Mr. G. Prince, Longworth, for Roses.

To Messrs. D. Prior, Colchester, for Roses.

To Messrs. D. Stewart, Wimborne, for shrubs.

To Messrs. R. Veitch, Exeter, for trees and shrubs.

To Messrs. Wm. Wood, Taplow, for trees and shrubs.

To Messrs. Wm. Wood, Taplow, for mixed group of Dahlias and herbaceous plants.

To Messrs. Sander, St. Albans, for Orchids.

Silver Hogg Medal.

To Messrs. Laxton, Bedford, for fruit trees and gathered fruit.

Flora Medal.

To Messrs. Burkwood & Skipwith, Kingston, for trees and shrubs.

To Messrs. Frank Cant, Colchester, for Roses.

To The Gayborder Nurseries, Melbourne, Derbys., for Michaelmas Daisies.

To Messrs. Hewitt, Solihull, for herbaceous plants.

To Mr. A. Gavin Jones, Letchworth, for mixed group of herbaceous plants and early-flowering Chrysanthemums.

To Mr. Ernest Ladhams, Godalming, for herbaceous plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. W. Treseder, Cardiff, for Dahlias.

To Mr. J. Hogger, East Grinstead, for Conifers.

Banksian Medal.

To Messrs. G. I. Adams, Tunbridge Wells, for shrubs and climbers.

To Messrs. Bentall, Romford, for Roses.

To Messrs. G. Bunyard, Maidstone, for trees and shrubs.

To Messrs. G. & A. Clark, Dover, for shrubs.

To Messrs. Dartington Hall, Devon, for shrubs.

To Messrs. Harrods, London, for clipped Box trees.

To Messrs. W. Keep, Enfield, for herbaceous plants.

To Messrs. B. Ladhams, Southampton, for herbaceous plants.

To The Marsden Hardy Plant Nursery, Ashted, for mixed group of rock-garden and herbaceous plants.

To The Ottershaw Nurseries, Ottershaw, for Conifers and shrubs.

To Mr. F. Rich, Worcester, for herbaceous plants.

To Messrs. Rich & Cooling, Bath, for mixed group of herbaceous plants and Dahlias.

To Messrs. J. Robinson, New Eltham, for mixed group of rock-garden and herbaceous plants.

To Messrs. Charles Turner's Nurseries, Slough, for Dahlias.

To Messrs. A. Warner, Colchester, for Roses.

To Mr. G. G. Whitelegg, Chislehurst, for rock-garden plants.

To Mr. Wm. Yandell, Maidenhead, for Chrysanthemums.

Hogg Medal.

To Messrs. Sale, Wokingham, for gathered fruit.

A lecture was given, on September 27, by Mr. H. Jolis, on "The Art of Flower Arrangement."

Chairman, Mrs. Lindsay Smith.

OCTOBER 4-5, 1932.

FRUIT AND VEGETABLE SHOW.

Chief Awards in the Competitive Classes.

FRUIT.

The Gordon-Lennox Cup, for the most meritorious display of fruit staged by an amateur.

To Sir Randolph Baker, Bt., Ranston, Blandford (gr. Mr. A. E. Usher).

The George Monro Memorial Cup, for the best exhibit of Grapes staged by an amateur.

To Hon. Mrs. H. Tufton, Castle Hill, Englefield Green (gr. Mr. H. H. Brown).

The Affiliated Societies Challenge Cup, for the best exhibit of fruit staged by an Affiliated Society.

To the Marlpit Hill Gardening Society, Edenbridge, Kent.

Class 1.—Amateurs. Collection of nine dishes of ripe dessert fruit.

First Prize, Silver Hogg Medal and £9.

To Lord Swaythling, Townhill Park, Southampton (gr. Mr. F. J. Rose).

Class 2.—Amateurs. Collection of six dishes of ripe dessert fruit.

First Prize, Silver Hogg Medal and £6.

To Major H. Beaumont, Danesfield, Marlow (gr. Mr. A. E. Friend).

Class 3.—Amateurs. Collection of eight bunches of Grapes.

First Prize, Silver Hogg Medal and £15.

To Lord Hotham, Dalton Hall, Dalton Holme, Beverley (gr. Mr. J. S. Coates).

Class 4.—Amateurs. Collection of four bunches of Grapes.

First Prize, Silver Hogg Medal and £6.

To Lord Swaythling, Townhill Park, Southampton (gr. Mr. F. J. Rose).

Class 19.—Amateurs. Collection of thirty dishes of hardy fruits.

First Prize, Silver Hogg Medal and £15.

To Sir Randolph Baker, Bt., Ranston, Blandford (gr. Mr. A. E. Usher).

Class 20.—Amateurs. Collection of twelve dishes of hardy fruits.

First Prize, Silver Hogg Medal and £6.

To J. H. Loudon, Esq., Olantigh, Wye (gr. Mr. J. Bond).

Class 21.—Amateurs. Collection of twenty-four dishes of Apples.

First Prize, Fruiterers' Company's Silver-gilt Medal and £9.

To C. G. A. Nix, Esq., Tilgate, Crawley (gr. Mr. E. Neal).

Class 22.—Amateurs. Collection of twelve dishes of Apples.

First Prize, Fruiterers' Company's Silver Medal and £4 10s.

To Lt.-Col. F. J. B. Wingfield-Digby, Sherborne Castle, Dorset (gr. Mr. E. Hill).

Class 25.—Amateurs. Collection of eighteen dishes of dessert Pears.

First Prize, Silver-gilt Hogg Medal and £9.

To Lt.-Col. F. J. B. Wingfield-Digby, Sherborne Castle, Dorset (gr. Mr. E. Hill).

Class 125.—Market Growers. Four British standard half-boxes of 'Cox's Orange Pippin' Apples.

First Prize, Silver Hogg Medal and £4 10s.

To Mr. T. B. Douglas, Boreham, Essex.

Class 126.—Market Growers. Four British standard half-boxes of any dessert Apple other than 'Cox's Orange Pippin.'

First Prize, Silver Hogg Medal and £4 10s.

To the Hollesley Bay Labour Colony, Suffolk.

Class 127.—Market Growers. Four British standard boxes of 'Bramley's Seedling' Apple.

First Prize, Silver Hogg Medal and £4 10s.

To the Hollesley Bay Labour Colony, Suffolk.

Class 128.—Market Growers. Four British standard boxes of any cooking Apple other than 'Bramley's Seedling.'

First Prize, Silver Hogg Medal and £4 10s.

To Reading University, Reading.

Class 129.—Market Growers. Three one-layer boxes of 'Cox's Orange Pippin' Apple.

First Prize, Hogg Medal and £3.

To Mr. T. B. Douglas, Boreham Essex.

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Class 130.—Market Growers. Three one-layer boxes of any dessert Apple other than 'Cox's Orange Pippin.'

First Prize, Hogg Medal and £3.

To Reading University, Reading.

Class 131.—Market Growers. Three one-layer boxes of 'Conference' Pears.

First Prize, Hogg Medal and £3.

To Messrs. F. & T. Neame, Faversham.

Class 132.—Market Growers. Three one-layer boxes of 'Doyenné du Comice' Pears.

First Prize, Hogg Medal and £3.

To Messrs. F. & T. Neame, Faversham.

VEGETABLES.

The R.H.S. Challenge Cup, for the highest aggregate number of points in the Vegetable Classes.

To Lord Riddell, Walton Heath House, Tadworth (gr. Mr. A. Payne).

The Riddell Cup, for a table of vegetables.

To Sir Randolph Baker, Bt., Ranston, Blandford (gr. Mr. A. E. Usher).

The Sutton Cup, for a collection of twelve kinds of vegetables.

To Lord Riddell, Walton Heath House, Tadworth (gr. Mr. A. Payne).

Class 203.—Amateurs. Collection of nine kinds of vegetables.

First Prize, Silver-gilt Knightian Medal and £4.

To Mr. William Robinson, Sunnysbank, Forstang, Garstang.

An informal discussion on "New Fruits" took place.

Chairman, Mr. E. A. Bunyard, F.L.S.

OCTOBER 11-12, 1932.

ORCHID SHOW.

COMPETITIVE AWARDS.

The Schröder Challenge Cup, for the best exhibit of Orchids staged by an amateur.

To Robert Paterson, Esq., Stonehurst, Ardingly (Orchid grower, Mr. A. Merry).

The Holmes Trophy, for the highest aggregate number of points for groups of imported Orchid species exhibited at the Society's Shows on April 5-6 and October 11-12, 1932.

To Sir Jeremiah Colman, Bt., Gatton Park, Reigate (Orchid grower, Mr. B. Perfect).

The Orchid Trophy, for the best exhibit of six Orchids staged by an amateur.

To H. W. Cole, Esq., Fieldhead, Corkran Road, Surbiton.

A lecture was given, on October 11, by Mr. W. J. Mitchell, on "Autumn Colouring and Berries at the Westonbirt Arboretum" (see p. 372).

Chairman, The Marquess of Headfort.

OCTOBER 25, 1932.

A lecture was given by Mr. D. E. Green, M.Sc., on "The Common Diseases of Roses."

Chairman, Dr. W. F. Bewley.

NOVEMBER 22, 1932.

Gold Grenfell Medal.

To Mr. F. Galsworthy, Chertsey, for floral paintings.

Silver Grenfell Medal.

To E. A. Bowles, Esq., Waltham Cross, for flower paintings.

To Miss C. Armitage, Ross, for Iris paintings.

To the Rt. Hon. Sir Herbert Maxwell, Bt., Whauphill, for flower paintings.

Grenfell Medal.

To Miss Margaret Collyer, Kenya Colony, for paintings of flowers of Kenya.

DECEMBER 13, 1932.

Silver-gilt Grenfell Medal.

To Mrs. Todd, Gibraltar, for paintings of plants collected near Gibraltar.

Silver Grenfell Medal.

To Mr. S. McLeod Braggins, The Gardens, La Mortola, Italy, for a collection of coloured photographs of the gardens at La Mortola.

To Mrs. A. C. Reeve-Fowkes, Eastbourne, for flower paintings.

To Miss E. Savory, Sandgates, Chertsey, for flower paintings.

Grenfell Medal.

To Mrs. Burden, for paintings of flowers from Ceylon.

To Mrs. C. G. Jeffery, Lee, for Iris paintings.

To Miss D. Ratman, Belgrave Road, S.W., for floral paintings.

To Mrs. A. G. Stubbs, Hove, for floral paintings.

To Miss R. Wheatcroft, Ewhurst, for floral paintings.

To Miss W. Walker, Hampstead, for floral paintings.

A lecture was given by Miss Eleanour Sinclair Rohde on "Medieval Gardens."
 Chairman, Mr. E. A. Bunyard, F.L.S.

JANUARY 10, 1933.

Silver Grenfell Medal.

To Miss J. Williams, Chelsea, for floral paintings.

JANUARY 24, 1933.

Silver-gilt Grenfell Medal.

To E. A. Bowles, Esq., Waltham Cross, for paintings of furred and feathered inhabitants of the garden.

To Miss E. Macfarlane, Cintra Park, London, for Orchid paintings.

Silver Grenfell Medal.

To Mrs. P. A. F. Stephenson, Carlisle Mansions, S.W., for paintings of Cotyledons.

Grenfell Medal.

To Mrs. V. G. Jeffery, Lee, for botanical paintings.

A lecture was given by Mr. N. K. Gould on "The Hot-water Treatment of
 Narcissus Bulbs."

Chairman, Mr. G. W. Leak, V.M.H.

FEBRUARY 7, 1933.

Silver Grenfell Medal.

To Miss M. I. Greenfield, Lindfield, for Orchid paintings.

Grenfell Medal.

To Miss I. M. Charters, Leicester, for flower paintings.

To Miss G. Thomasett, Lee, for flower studies.

A lecture was given by Mr. J. M. Bridgeford on "Annuals" (see p. 387).
 Chairman, Mr. W. R. Oldham.

FEBRUARY 21, 1933.

Silver Grenfell Medal.

To Miss E. Savory, Chertsey, for flower paintings.

To the Rev. W. K. Martin, Newton Abbot, for flower paintings.

Grenfell Medal.

To Messrs. Ryder, St. Albans, for colour photographs.

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REPORT of the ONE HUNDRED AND TWENTY-NINTH ANNUAL MEETING, held on Tuesday, February 21, 1933, in the Lecture Room, New Hall, Greycoat Street, Westminster.

The Hon. HENRY McLAREN, C.B.E. (President), in the Chair, supported by Members of Council and about two hundred and twenty Fellows.

The SECRETARY read the notice convening the Meeting.

The SECRETARY announced that the Minutes of the last Meeting held on February 23, 1932, had been circulated in the JOURNAL, Vol. 57, Part 2.

The CHAIRMAN then moved that the Minutes be taken as read, that they be and are hereby adopted and that he be authorized to sign them.

The motion was seconded and agreed and the Minutes were signed by the Chairman.

The PRESIDENT : I now rise to move that the Report of the Council be and is hereby approved. That Report covers a very wide range of activities and I only propose this afternoon to deal with a small number of them. I should, however, like to say that I am quite prepared when the Resolution has been moved and seconded to answer any question that any Fellow likes to raise on any point in the Report or on the work of the Society.

I think that if we read the Report we can claim that in a year of great and exceptional difficulties the Society has managed not only to maintain a strong position but to carry on its activities undiminished and even to some extent augmented.

The membership this year has fallen from that recorded last year by 693. That follows on a net loss of 414 in the previous year, making a total loss of some 1,107 members from the highest total of 28,060—under 4 per cent. But to set off against that the Secretary informs me that since January 1 this year we have already elected 1,317 new members. That, of course, is a gross figure which does not take into account deaths and resignations, but that figure of 1,317 compares with an average over the last four years of new members elected at this date of about 800 each year, so that evidently we are shaping for a revival in our membership.

When we congratulate ourselves on this huge total of members we must not forget to put the credit where it is due, namely to those four men who did so much many years ago for our Society: Sir Trevor Lawrence, President for so many years; Mr. Wilks, Secretary for so many years; and Mr. Gurney Fowler and Sir Daniel Morris, Treasurers for so many years. I am reminded of this because we saw to our great regret the other day the news of the death at a very advanced old age of the last of those four great stalwarts, Sir Daniel Morris, and we remembered the great work that he had done for the Society in the past.

Now, at this Annual Meeting, we always, as you know, have a change in the composition of the Council. Three members are leaving us. There is our friend Mr. Cuthbertson, a tower of strength to us always, a wise counsellor and a very generous friend in all matters horticultural; we shall feel his loss extremely. Then there is Mr. Bowles, who has been a member of the Council for more years than most of us can remember. The Secretary has shown me to-day the Minute appointing him in 1901 as a member of the Scientific Committee, the first official position he held with the Society, and the Minute read that he was appointed because he was "a young man with plenty of leisure." I think that description applies to him to-day as it did then. He keeps us straight on Narcissi and Bulbs and on all matters connected with Art; he keeps us straight on the nomenclature of plants, and he keeps us straight on our grammar, and those are very great qualities in a member of Council. He is the repository of all the old traditions of the Society and, above all, he is a man who is always willing to take up a task if he is asked to do so. We shall feel his loss greatly. The third member we shall lose is Mr. Stevenson. He is a man of very great business experience which he puts at our disposal, and above all he has a specialized knowledge of one or two branches of business in which the work of the Society is concerned which has been in the past of great service to us: for instance, in matters concerning publication and matters concerning building. Those are three members we are losing from the Council.

We are also losing the services of Mr. Musgrave, not, I am glad to say, from the Council itself, but from the post of Treasurer. Mr. Musgrave, as you know,

most generously undertook at our request to act as Treasurer for the year just ended, while Mr. Trotter, who was Treasurer the year before, was not on the Council. We had great diffidence in asking Mr. Musgrave to undertake this task because he was also doing so much other work on behalf of the Society, but he generously consented and we are extremely grateful to him.

Now to replace these three members of the Council there are nominated—and as there are no other nominations they will shortly be declared elected—firstly, Mr. Trotter as Treasurer. Now Mr. Trotter knows all about the mysteries of banking, and while he is our Treasurer we can be assured that when we have a credit balance—as I hope we shall have for the greater part of the year—that credit balance will bear the highest possible interest—it will not be a very high rate of interest—and when we have an overdraft as is apt to be the case for a few weeks at the end of the year—a diminishing one each year—then I think we shall ask him to see that it bears the very lowest possible interest but it will not be a very low interest. Why the interest on our balance should not be a very high interest and why the interest on the overdraft should not be a very low interest is one of those banking mysteries which I hope he will explain to us when he rejoins the Council.

Then we have Sir William Lawrence. He is the last man to need an introduction to any gathering of gardeners in any part of the country or even of the world. We all of us know his plants; we know his writings; we know his opinions; and all of them interest us extremely.

The last new member is Mr. Bridgeford, who will bring to the work of the Council the knowledge of a great horticultural business of which he has done much to forward the success.

These three gentlemen will be a very great addition to our Council, and I think we can congratulate ourselves that we have secured their services.

Let me now say just a word or two about some of the activities of the Society past and future which are dealt with in the Report.

I should first like to mention the work that is being done by our Technical Adviser, Mr. Chittenden. Mr. Chittenden has now had a little more than a year's work in the position to which he was appointed. He has in that year undertaken the very heavy task of reorganizing the Library, because he is also our Librarian, and housing it in its new rooms. I think that those of you who are in the habit of consulting our Library will agree with me that much progress has been made in that department. Incidentally I may say the Council has appointed—he started work on January 1—a new Assistant Librarian who will replace Mr. Hutchinson, the present Assistant Librarian, when the latter reaches his retiring age as he will do in the Autumn. Mr. Chittenden has not only done that, but he is Editor, as you know, of many of our publications. In that connexion I think we must congratulate him on that very striking volume "Conifers in Cultivation," the Report of the Conifer Conference, that I think will long remain a classic on Conifers generally. If there are any Fellows here who do not possess a copy of that work and who are interested in Conifers, I would strongly recommend it to them. But besides these two other tasks, he has found time to reply to a great number of questions addressed to him on technical horticultural and scientific matters by the Fellows of the Society. The scientific matters where they require research or investigation are, of course, referred to our Laboratory at Wisley, but Mr. Chittenden is responsible for the answers, and from what I can hear the assistance he has given to our Fellows has been very much appreciated.

Then I would like to say a word or two about Wisley. Mr. Harrow, the Director whom we appointed some fifteen or sixteen months ago, is now seated firmly in the saddle—or perhaps, to use a more horticultural metaphor, has now got his foot firmly on the spade. Those of you who have visited Wisley will have recognized that many improvements, some of a minor and some of a more important character, have been made. Mr. Harrow has brought with him from Edinburgh a tradition of good cultivation of difficult plants and we hope more and more to make Wisley, in spite of the deficiencies of climate and sometimes a rather difficult soil, a garden where people may go and see how difficult plants can be well cultivated.

We are, as you know, continuing the policy of trials and of standard collections, but we are making this alteration: we feel that there are too many horticultural varieties of plants, not too many good plants, but too many bad ones. Therefore, Mr. Harrow is consulting with the Joint Committees where there are Joint Committees, or with recognized experts where there are no Joint Committees, as to what number of plants should be grown in each permanent collection, limiting them as far as possible either to plants that have been certificated by the Society or that have some other strong claim to greatness, so that those

of our Fellows who go to Wisley in future will, we hope, see in the standard collections merely a collection of the best plants, the inferior ones being eliminated.

Another direction in which we want to direct the energies available at Wisley is to the distribution of new and rare plants. As you know, in the old days the Royal Horticultural Society was the body which introduced the great bulk of the new plants that came into this country. We sent out collectors like Douglas to the Western United States, and other eminent collectors, and we got for the gardens of our Fellows a whole host of new plants. In the bad time which fell on the Society this work was discontinued and was taken up more by the Nurserymen of the day, as, for instance, by the firm of Messrs. James Veitch. Again that phase passed and the collection of new plants has been carried out over the last twenty years very largely by syndicates of private garden owners. It has been the policy of the Council to encourage the formation of such syndicates by subscribing to them where prospects of success seemed assured. We propose, as far as possible, to continue that policy, to grow the plants at Wisley and to have those new introductions, where they are of merit, available as far as possible for distribution to our Fellows.

Another innovation we are trying at Wisley. We recognize that many of our Fellows, especially those who have perhaps smaller gardens and unskilled labour, would sometimes wish to see seed-sowing, pruning and planting carried out after the most approved methods, and to have the operations explained to them. We are therefore arranging that at certain dates during the year these operations will be carried out at Wisley and any Fellow who cares to come and see them in progress and to ask questions about them on the spot will be welcomed. The dates are published in our Book of Arrangements.

May I, before concluding what I have to say about Wisley, express our indebtedness to certain members of the Council who have done a great deal of work there last year in helping Mr. Harrow, notably among them Mr. Musgrave, who has spent very many days at Wisley discussing problems with Mr. Harrow and trying to solve some of the problems that are bound to arise. We are also greatly indebted to Mr. Hay, to Mr. Bunyard, and to Sir Daniel Hall, the latter two of whom have taken a special interest in the question of fruit and our fruit trials.

Now I would like to turn to the question of the Chelsea Show. You know that for many years past the arrangement was that the judging finished early on the afternoon of Tuesday and that then the Show when all its flowers and plants were freshest stood without visitors except for members of the Council and Committees and Exhibitors, while Fellows were not admitted until the Wednesday morning. The Council felt that that was a waste of a good opportunity and we felt sure that it would be appreciated by our Fellows if they were admitted to the Show on that Tuesday afternoon. We therefore made arrangements to that end last spring. Unfortunately, from some points of view the opportunity appeared rather too popular; very many of our Fellows—more than we expected—took advantage of the opportunity to see the Show that afternoon, and I am afraid—for which we must apologize—that there was a rather inconvenient crowding at the gates and also some inconvenient crowding in the Show itself. The first of these inconveniences we propose to remedy this year. We have, by the kind permission of the Hospital Authorities, arranged to throw open the Ranelagh Gardens an hour before the Show itself opens. The Ranelagh Gardens will be opened at 3 o'clock on the Tuesday afternoon, while the Show opens at 4. In the Ranelagh Gardens there will be seats, and a band from 3.30, and light refreshments so as to make the time pass agreeably for those who come before 4 o'clock. Those who do not wish to join in the first rush when the Show gates are opened can sit there for some little time afterwards and take a convenient opportunity of entering the Show itself. But as far as crowding in the actual Show grounds is concerned that must be a question for Fellows. We cannot discriminate, I think, between the Fellows whose names begin with "A" and those whose names begin with "M" and say that those who are first in the alphabet shall come one day and others another day. But I would say to you that although the Show was crowded last year from 4 to 5.30, it was not at all crowded from 5.30 onwards. Those who want to see the Show at greater convenience might perhaps time their arrival so that they come a little bit later. But here, again, we must rely on the Fellows in another way; we are very anxious to keep this first day to Fellows only, or in the case of Fellows subscribing two or four guineas, to Fellows and a friend actually accompanying them. We do hope that there will be no irregular use of admission tickets, for such use means that a lot of people who have no right to be there may come in and so add to the crowding and inconvenience suffered by our Fellows.

Among our activities this summer there is the proposed Lily Conference which will include *Nomocharis* and *Fritillaries*. I hope very much that the Lily Conference will be able to show me at any rate—some others of you may be more successful—how to grow *Nomocharis*. It certainly will make a focus whereby we may have a congress of persons interested in Lilies not only from this country but we hope from the United States and Continental countries. The Lily Conference is the outcome to some extent of the Lily Group which we are organizing within the Society. The Lily Group, as you know, has a "Lily Year-Book" which is being published, and any Fellow of the Society is eligible for membership of the Group without any further charge at all. We welcome in that group anyone who is interested in Lilies. I may say that we are very much indebted both in the arrangements for the Lily Conference and in the arrangements for the "Lily Year-Book" and the Lily Group to Mr. F. C. Stern, who has displayed a great amount of energy and given a great amount of time to organizing these matters.

Then we are to have on April 25 and 26 a competitive show of early market produce. As you know, the Ministry of Agriculture is very anxious, now that tariffs have been put on imported agricultural produce, that the home producers should be encouraged to fill the gap, because the duty, we understand, was intended not so much to raise revenue from imports as to encourage the home producer to compete with the imported article. We have decided to do what we can to encourage this movement by holding this show on April 25 and 26; and, again, on August 29 and 30 we are holding an exhibition of dried bulbs to show that British bulb growers can produce good dried bulbs fit to plant in our gardens.

Our last activity which I will refer to will be the Autumn Show which is to be held this year at Olympia. We have long been aware that those of our Fellows who live at a distance and others like professional gardeners, who perhaps have not much time to spare to come up to London on more than a few occasions, would very much welcome instead of a series of shows such as we held here last autumn, one large show at which the autumn flowers and the autumn shrubs could be combined. We had an opportunity of leasing one of the halls at Olympia, the National Hall—not the largest hall but the one in front of it—and we accepted that opportunity and as you will see from our Book of Arrangements we are holding this year one big Autumn Show. We hope that this innovation will not only be welcome to our Fellows, but as the show will be open in the evenings, we hope that we shall attract a certain number of persons who are not Fellows but who have acquired what I may call "the Olympia habit," and we hope that the sight of the plants and shrubs that will be exhibited at that show may induce them to take an interest in horticulture and perhaps induce them to become eventually Fellows of the Society. We have an informal arrangement whereby if the show is a success we can take the Hall on again next year.

Lastly, I know you will forgive me if I emphasize a point which I made here last year in regard to the horticultural trade. The horticultural trade at the present moment is fighting a gallant battle against very adverse conditions, and I want to impress upon you the importance to horticulture and to horticulturists generally of maintaining the nurseries of this country in an efficient condition. Our gardens have relied upon them in the past; our gardens will have to rely upon them in the future, and if we are to rely upon them in the future they have got to be kept efficient at the present time. The trade have got to be in a position to transplant their plants, to propagate their plants, to raise new plants, to make hybridizing experiments, and generally to maintain their establishments in an efficient condition. It is very difficult to do so if they cannot retain at any rate a very substantial portion of their former trade. This is a matter which is largely in our hands. I think that it is not inappropriate to say these words here because I have always regarded the horticultural trade as being partners with us, and very important partners, in the work of this Society. The great shows which gather us together are 90 per cent. due to the efforts of the horticultural trade, and after all our shows are the mainstay of our Society.

Now, Ladies and Gentlemen, I have trespassed long enough upon your time, so I will call upon the Treasurer, Mr. Musgrave, to second the Resolution, and then I shall be very glad to answer to the best of my ability any questions that may be put to me.

MR. C. T. MUSGRAVE: Mr. President, Ladies and Gentlemen,—You have all received a copy of the Accounts and the Balance Sheet in the Book of Arrangements which is in your hands, and I do not propose to weary you by going through all the details of these accounts; I will merely refer to certain matters to which I think your attention ought to be drawn.

Notwithstanding the financial difficulties of the past year the position of the Society remains sound. It would not have been surprising if the number of Fellows had dropped seriously, but in fact the total number of about 27,000 has only decreased by 693. That the numbers have kept up so well is due to the national interest that horticulture has for all of us, and we are grateful for the material aid which the trade have so willingly given in drawing the attention of their clients to the advantages of becoming Fellows of the Society.

From the point of view of expenditure the year has been an uneventful one. There has been no heavy expenditure such as we have had to face in past years for the New Hall and for the improvement of the Offices and the New Library in the Old Hall. You will observe that we are making due allowances to the fund for depreciation and renewals. A sum of £2,255 has been appropriated to that fund, raising the total to £10,000. This we consider is sufficient to meet the claims that may be made on it during the current year. There will be no appropriation under this heading in next year's accounts. The placing of this sum has been a heavy expenditure to the Society during the present year. In the event of no claim being made on the fund during the current year it will mean that there will be a saving in next year's account of £2,255, which I think you will recognize as satisfactory.

Further, a sum of £980 has been added to the Sinking Fund on the Old and New Halls, raising the total of this fund to £4,329. This, of course, will be a recurring item for many years to come.

The receipts of the Chelsea Show were disappointing and did not reach the amount we had hoped for. There was, as you will remember, one very wet day. The accounts show that the expenses exceeded the receipts by £1,201. Against such a loss you are aware that we have a weather insurance of £3,000 which we can fall back on in the unlikely case of a very serious loss owing to bad weather.

The amount received from annual subscriptions has fallen by £2,577, from £43,870 in 1931 to £41,293 in 1932—a trifle under 6 per cent. But bearing in mind the difficulties of the times through which we are passing I think we may well congratulate ourselves that the fall has not been greater. It is satisfactory to be able to record that the Bank Overdraft of last year which amounted to £10,142 has been reduced to £5,261. I should perhaps explain that an overdraft became necessary a year or two ago to enable us to complete the payments out of income for the alterations and improvements in the Offices and the alteration in the Old Hall buildings. It is of a temporary character and it was in the month of November last that we found it necessary to seek that accommodation. If the rise in the number of Fellows joining the Society at present is any indication of the prospects of the present year we shall certainly regain much of the ground we have lost during the past year.

Now turning to the Accounts and Balance Sheet of Wisley you will notice that on the expenditure side the figures are grouped under the same headings as last year. I may say the entry "Miscellaneous" under each heading represents the ordinary purchases necessary for carrying on the work of the Society. If any Fellow cares to see the items making up the details mentioned in the Accounts under the heading of "Miscellaneous," I have the figures available and shall be happy to show them to him after this meeting. It will be noticed that there is an increase of cost to the Society in the upkeep of the gardens of £656. This increase is accounted for mainly by two items: the first is the increase of wages under the heading "Garden" due to the fact that the new student gardeners who have taken the place of the unpaid students are now paid a maintenance allowance; the second is the repairs of the Bothy due to the institution of the new student gardeners.

There is one item in the Wisley Balance Sheet to which I ought to draw your attention although it is a very small matter. The sum of £219 7s. 2d. under the heading "Wisley Adjustment Account" on the Assets side of the Vincent Square Balance Sheet is a balancing item only and corresponds with a similar amount on the Liability side of the Wisley Balance Sheet. It represents the net increase in stocks at Wisley at the end of the year 1932 paid for out of the Society's Vincent Square Account. If there was an amalgamation of the two balance sheets this item would, of course, entirely disappear.

This completes the matters to which I thought it right to draw your attention and there is one further remark I should like to make. The financial position of the Society is quite sound, but in these days of heavy taxation and diminishing incomes it behoves us all to "gang warily" and I would ask you to assist the Council in strengthening the position of the Society. This you can do by using your best endeavours to induce your friends to join the Society and so enable it to maintain the present high standard of its work.

I have much pleasure in seconding the adoption of the Report and Accounts.

The CHAIRMAN : Would any Fellow like to put any question ?

Mr. ELLIS : May I be allowed to make one remark. I have carefully analysed the figures of this Society for the past ten years and the remark I have to make is this—it has established my confidence in the control of the Council. There is no need for any criticism or critical enquiry.

The PRESIDENT : Thank you, Mr. Ellis, for your unsolicited testimonial. If there are no questions I will put the Motion that the Report of the Council be and is hereby adopted.

(Motion put and carried unanimously.)

Mr. MUSGRAVE : There is only one nomination for the President, and therefore, in accordance with Bye-law 57, I declare Mr. McLaren duly elected President of this Society.

The PRESIDENT : This is the third time that you have done me the very great honour of appointing me to so distinguished a position, a position not only distinguished in itself as being the head of a Society of this standing and of this magnitude, but rendered even more so by the fact that it has been held by many distinguished predecessors. The only plea that I can submit to you to induce you to overlook my many shortcomings in this office is the plea that I am very greatly interested both in horticulture and in the Society. I not only feel an interest in horticulture and the Society but I feel an affection for horticulture and the Society. May I add that the work of your President is made very easy by the ability and the loyalty of your Council ; by the excellence and by the industry of your Secretary and his Staff ; by the spirit of kindness and co-operation that is displayed by exhibitors ; by all those with whom we come in contact in our work ; by the Press and the public ; and last but not least by our Fellows. I thank you, ladies and gentlemen.

I now have to declare the election of the following persons to the offices that I will name, they having been duly nominated and no further nominations having been received :

As Vice-Presidents :—

The Duke of Bedford.
The Duke of Portland.
The Viscount Ullswater.
Sir James Knott, Bt.
Rt. Hon. Sir Herbert Maxwell, Bt.
Lieut.-Col. Sir David Prain.
Mr. E. A. Bowles.
Mr. William Cuthbertson.
Mr. G. W. E. Loder.
Mr. J. C. Williams.

As Members of the Council :—

Sir William Lawrence, Bt.
Mr. J. M. Bridgeford.
Mr. R. D. Trotter.

As Treasurer, Mr. R. D. Trotter.

As Auditor, Mr. J. S. Feather, of Messrs. Harper, Feather & Paterson.

I now move a small amendment to the Bye-laws. The Bye-laws prescribe a certain form of application for membership. This form has been found in practice to be a rather cumbrous one and we propose to substitute for it one that is more simple but which does not differ in any material way from the one at present in force. I suggest that we might take the actual form as read, as it is all set out in full in the Agenda. I will move :—

THAT the form marked " A " appearing in the second appendix to the Bye-laws and referred to in the Bye-laws 3 and 8 be revoked and the form of application for admission and nomination as set out in the Agenda be adopted in lieu thereof.

FORM OF APPLICATION FOR ADMISSION AS A FELLOW OF
THE ROYAL HORTICULTURAL SOCIETY.

I hereby apply to be admitted a Fellow of The Royal Horticultural Society,
and I wish to subscribe ^(four) ^(two) guineas a year, and I undertake if and when
^(one)
elected to pay my annual subscription (and entrance fee, if any), and to observe
the Bye-laws of the Society and the Rules and Regulations which may from
time to time be made under the authority of the same for the government of
the Society so long as I continue a Fellow thereof.

Signed

Title or Profession.....

Address

Dated this.....*day of*.....19

And I,....., being a Fellow of The Royal Horticultural Society, nominate the above-named for election as a Fellow of the Society.

Signed

Address

Dated this.....*day of*.....19

I will ask Mr. Bowles to second the Motion.

Mr. E. A. BOWLES : I have great pleasure in seconding this, believing it to be a great improvement on the older form. If there were no other recommendation for it, it removes from the applicant for Fellowship and also his supporter, the grovelling position of having to " beg leave " to proceed any further in the matter. I second the Motion.

(Motion put and carried unanimously.)

The CHAIRMAN : I now have the very pleasurable task of making presentations.

(The President then made the following presentations, the names of the recipients being announced by the Secretary) :

VICTORIA MEDALS OF HONOUR.

The Victoria Medal of Honour.—To Sir William Lobjoit, for his public services on behalf of horticulture.

The CHAIRMAN : Sir William, you have always been of the very greatest assistance to horticulture in your distinguished position at the Board of Agriculture, and now that you have left it you still continue to do all that is in your power to advance horticulture. I have the very greatest possible pleasure in presenting you with the Victoria Medal of Honour and Diploma.

Victoria Medal of Honour.—To Mr. F. W. Millard, who has introduced to cultivation so many new flowering plants.

The CHAIRMAN : Mr. Millard, you have introduced to cultivation a host of new plants. You have not only done that but you have taught other gardeners how to cultivate them, myself included, and among all the plants that you have introduced or raised we all of us recollect with pleasure that wonderful Phlox, Phlox ' Camla.' I congratulate you and present you with the V.M.H.

Victoria Medal of Honour.—To Mr. E. A. Laxton, for his work in raising and introducing new fruits.

The CHAIRMAN : Mr. Laxton, we owe to you some wonderful novelties in fruit and especially in strawberries. When Fellows of this Society enjoy their strawberries they ought to think of you. I only wish, Mr. Laxton, we could add a wreath of strawberry leaves to your armorial bearings. We cannot go as far as that, but we do the next best thing in our power and we present you with the V.M.H.

Victoria Medal of Honour.—To Mr. D. Bliss, for his work in connexion with the Public Parks and Gardens of Swansea.

The CHAIRMAN : Mr. Bliss, I believe that for thirty years you have been in charge of the parks at Swansea and in that time you have created there a garden which has I think among the parks few rivals in interest. Those of us who know Swansea will know that you have collected there a great assemblage of economic plants and of British plants; and the economic plants are so arranged that one sees the way they are used for economic purposes. Your example, I venture to say, might be more widely followed by park superintendents throughout the country. I congratulate you and present you with the V.M.H.

ASSOCIATESHIPS OF HONOUR.

The Associateship of Honour was then conferred on the following :—

Mr. W. G. BAKER, Curator of the Botanic Garden, Oxford. [Unable to be present.]

Mr. J. S. CHISHOLM, Head of the Department of Horticulture in the Edinburgh and East of Scotland College of Agriculture. [Unable to be present.]

Mr. WM. CRAVEN, Head Gardener to the Weymouth Corporation.

Mr. E. GIBSON, of the Headquarters Staff of the London County Council Parks Department.

Mr. WM. HALES, Curator of the Chelsea Physic Garden.

Mr. F. HORWOOD, Foreman to Messrs. Kelways, Ltd.

* Mr. J. JONES, Head Gardener to Mr. R. J. Corbett, Ynys-y-Maengwyn, Towyn.

Mr. F. R. LONG, Superintendent of Public Parks, Port Elizabeth, South Africa.

Mr. D. McINNES, head gardener to the Earl of Strathmore, Glamis Castle. [Unable to be present.]

Mr. P. MANN, Horticultural Instructor and Adviser to the Buckingham County Council (retired). [Unable to be present.]

Mr. E. MARKHAM, head gardener to Mr. Wm. Robinson, of Gravetye Manor, East Grinstead.

Mr. H. MARKHAM, head gardener to the Earl of Strafford, Wrotham Park.

Mr. G. TAYLOR, head gardener to Sir John Ramsden, Bt., at Bulstrode Park.

Mr. G. M. TAYLOR, of Messrs. Dobbie & Co., Ltd. [Unable to be present.]

Mr. F. TROUGHTON, Nursery Manager to Messrs. J. H. White & Co., Ltd.

Mr. A. E. VASEY, of Messrs. Carter Page & Co., Ltd.

Mr. C. F. WOOD, gardener to Mr. E. M. Preston, of The Warren, Hayes.

The Lawrence Medal.—To Messrs. Dobbie, Edinburgh, for their exhibit of annuals and biennials staged on July 19, 1932.

The Holford Medal.—To Sir Jeremiah Colman, for his exhibit of Orchids staged on April 5, 1932.

Veitch Memorial Medal in Gold.—To Sir Frederick Moore, for his services to horticulture.

Veitch Memorial Medal in Gold.—To Lieut.-Col. Sir David Prain, for his services to horticulture.

Veitch Memorial Silver Medal and £50.—To Dr. Lloyd Praeger, for his work on *Sempervivums*. [Unable to be present.]

The Sander Medal.—To Mr. R. Paterson, for *Miltonia* 'Mrs. J. B. Crum' var. 'Chelsea,' shown at the Chelsea Meeting, 1932.

The George Moore Medal.—To Dr. F. Craven Moore, for *Cypripedium* 'Pickwick,' shown on December 13, 1932.

The Williams Memorial Medal.—To Mr. J. L. Richardson, for his exhibit of Daffodils staged on April 14, 1932.

* Died January 24, 1933.

The Williams Memorial Medal.—To Messrs. Blackmore & Langdon, for their exhibit of Begonias staged on September 20, 1932.

The Cory Cup.—To Mr. Lionel de Rothschild, for his Rhododendron 'Romany Chai,' which was shown on June 21, 1932.

The Loder Rhododendron Cup.—To Mr. Harry White, of the Sunningdale Nurseries, in recognition of his work in the propagation and cultivation of Rhododendrons.

Sir JEREMIAH COLMAN : We cannot part without passing a cordial Vote of Thanks to our Chairman and President for his conduct in the Chair. I counted myself rather an old stager until he made reference to those who have passed who have done such yeoman service for this great Society. But I can at least claim to be a link with the past because it was my old friend, Sir Trevor Lawrence, a former and noted President, who claimed to have led me into orchid growing. If that has been of the advantage to the Society which our President so generously says, my family have felt it has endangered the family fortunes and my own health through going too frequently into the orchid houses. Again I can claim a link with the past, because I am very proud to-day to have received the Holford Medal which the Council in its discretion has awarded to a group of mid-Victorian species. I never in my wildest moments imagined the old species would come into their own again, and if I may say so, I congratulate the Council on its courage in giving recognition to the old species, many of which are most delightful.

Within the past few months a great sorrow has come into the life of our President, and in according him our sympathy I should like also to say how very fully we are alive to the fact that horticulture has sustained an irreparable loss by the passing of Lady Aberconway, who for so long has taken a deep and practical interest in horticulture in so many branches. Our President has told us that he knows of only two reasons why he is competent to fill the position which he so well occupies : one, his affection for horticulture ; and the other, his interest in the Royal Horticultural Society. You and I know of many other reasons, so well known to us that I will not take up the time of this meeting by detailing them. But on one of the many occasions on which I happily meet our President in various capacities I will confide them to him. There are exceptions to every rule, and—having been associated with our President in many capacities—there is one and only one thing I know to which he is unable to do justice, and that is a good luncheon. Maybe he sacrifices himself in the cause of horticulture, but I can assure those of you who do not know, that when he sits down to luncheon having devoured an apple he considers that amply sufficient, and then asks me for the key of my orchid houses. Perhaps the best evidence I can offer of my confidence in our President is the fact that I very readily hand over the key notwithstanding the valuable pollen which must form a temptation to so experienced a hybridist.

I am sure the President does not wish me to take up the time of this meeting by a lengthy speech. Your acclamations will be of more value to him than any words which I can utter, but as your spokesman I wish to convey to him our sense of the able and tactful way in which he has presided over our deliberations, and to record our thanks to the Council over whom he so ably presides for the work that they have done in connexion with this great Society and which has secured for it a world-famed position. Those of us who are lovers of our gardens sincerely thank our President and the Council for the valuable and onerous services which they have rendered to horticulture, for which we have such a very great affection.

Dr. CRAVEN MOORE : In rising to second this Motion which has been so ably proposed by Sir Jeremiah Colman there are two points I should like to stress. One is, that to attend these proceedings is to realize the unlimited capacity of our President for the smooth and efficient guidance of the affairs of this great Society ; the other is, that to receive any distinction of the Society at his hands is to realize the charm with which he can pour over such recipients melted butter in lavish proportion. I have very much pleasure in seconding this Vote of Thanks.

(Resolution put and carried with acclamation.)

The CHAIRMAN : Sir Jeremiah, and Dr. Craven Moore, I thank you for your too kind words about myself, and I thank you, ladies and gentlemen, for the very cordial manner in which you have received this resolution. I can assure you that it has been a great pleasure to me to preside over a meeting which has shown such evident appreciation of the work of your Council and of your Staff. I thank you, and declare the proceedings terminated.

REPORT OF THE COUNCIL FOR THE YEAR 1932.

1. **The Year 1932.**—It is gratifying to report that, in spite of adverse conditions, the interest in Horticulture has not flagged. Some three hundred more new Fellows have been enrolled this year than was the case in 1931; on the other hand, deaths and resignations are both somewhat heavier.

2. **Numerical Strength.**—

LOSS BY DEATH IN 1932.				ELECTED IN 1932.			
Honorary Fellows	...	...	3	Honorary Fellows	...	...	3
Associates of Honour	...	...	3	Associates of Honour	...	...	16
Life Fellows	...	...	17	Life Fellows	...	...	15
4 Guinea Fellows	...	...	4	4 Guinea Fellows	...	...	16
2 " "	...	...	248	2 " "	...	...	887
1 " "	...	...	185	1 " "	...	...	1,345
Associates	...	...	3	Associates	...	...	81
			463	Societies	...	...	50
LOSS BY RESIGNATION IN 1932.							2,413
4 Guinea Fellows	...	...	11	Deaths and Resignations	...	...	3,106
2 " "	...	...	1,294	Elected	...	...	2,413
1 " "	...	...	1,202				693
Associates	...	...	69	NET DECREASE	...	...
Societies	...	...	67				
			2,643	Total on November 10, 1931			*27,690
				Total on November 8, 1932			26,997

3. **Obituary.**—The Society has to regret the loss of a number of eminent horticulturists and valued friends. Among them are: Mr. Leonard G. Sutton, a Vice-President of the Society, and for many years a Member of Council; Professor Geheimrat Karl von Goebel, Director of the Botanic Institute, Munich; Professor S. A. Beach, of State College, Ames, U.S.A.; and Mr. Walter E. Ledger, Honorary Fellows; Dr. F. V. Darbishire, a member of the Society's scientific staff at Wisley; Mr. William Crump, Mr. George Forrest, the Hon. Vicary Gibbs, Mr. James Hudson, Miss Gertrude Jekyll, Mr. A. Mackellar, and Mr. J. Rochford, holders of the Victoria Medal of Honour; Mr. John Hoare, Mr. T. W. Taylor (Curator of the Royal Botanic Gardens, Kew), and Mr. C. Wakely, Associates of Honour; while of the Fellows mention must be made of Colonel Sir Herbert Jekyll; Mr. F. Barchard, a member of the Narcissus and Tulip Committee; Mr. J. J. Joicey, the exhibitor of orchids; Mr. J. D. Pearson, a member of the Narcissus and Tulip Committee; and Colonel Sir John Rutherford, a member of the Orchid Committee.

4. **Fortnightly Meetings and Shows.**—The attendances at the Fortnightly Meetings and Shows at the Halls have been well maintained. The extension of time on the first day of two-day shows to 9 P.M. will be again in force for the coming year. During the past year a number of invitations have been sent to members of the staffs of large business organizations to visit one of the flower shows after the close of their working hours. These invitations have been largely availed of, and it is hoped that the habit of attending the shows during the evening hours will increase.

5. **Attendance at Fortnightly Shows to date.**—1931, 101,636; 1932, 110,586, including 4,878 special visitors.

6. **Lectures.**—Large attendances showed the appreciation felt by the Fellows of the lecture programme of the year. The Society owes a debt of gratitude to

* An adjustment of the total fellowship of the Society (27,612 in 1931) has been made by a recount of the card index.

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the various lecturers for their willingness to help the Society in this respect. An interesting lecture programme for the coming year has been arranged, in course of which the Institute of Landscape Architects is again contributing lectures on Garden Design.

7. The Daffodil Show, April 14-15, 1932.—In spite of the inclement spring weather, the exhibits were not only greater in number than in any of the previous three years, but were of high quality and excellence. In 1933 the Show will be held on Tuesday and Wednesday, April 11 and 12.

8. Exhibit of Home-grown Produce.—At the Fortnightly Meeting on Tuesday, April 26, 1932, in view of the desire of the Government to encourage the home-production of vegetables, fruit, and flowers, there was staged a special exhibit of home-grown produce in market packages designed to demonstrate the variety of vegetables, fruits, and flowers that may be obtained in quantities from the market gardens in Great Britain. The Show was opened by Lady Gilmour and the Minister of Agriculture. The Council desires to record its thanks to them, to the Ministry of Agriculture and Fisheries, to the organizing committee, and to the many associations and exhibitors who so generously gave their help.

9. Show of Early Market Garden Produce, 1933.—In continuation of this policy of encouraging home production, it has been decided to hold a special Show on Tuesday and Wednesday, April 25 and 26, 1933, of early market garden produce. A special pamphlet, entitled "Cultivation of Early and Late Salad Crops for Market Purposes," and a schedule have been prepared and circulated to those interested in the production of early salads.

10. The Chelsea Meeting, 1932.—The Chelsea Meeting, which was held on Wednesday, Thursday, and Friday, May 25, 26, and 27, was honoured by the gracious visit of Their Majesties the King and Queen. The exhibits reached a very high standard of excellence, and there was a very large attendance of Fellows.

11. The Chelsea Meeting, 1933.—In 1933 the Meeting will be held on Wednesday, Thursday, and Friday, May 24, 25, and 26.

12. The Amateurs' Flower Show, 1932.—The eighth Amateurs' Flower Show was held on Tuesday, June 28. Due to the somewhat trying season, there were fewer exhibits than in 1931, but nevertheless the Hall was well filled. In 1933 the Show will be held on Tuesday, June 27.

13. Exhibit of Home-grown Bulbs, 1932 and 1933.—At the Fortnightly Meeting held on Tuesday, September 6, special exhibits of home-grown bulbs were staged to demonstrate the development of the British bulb-growing industry. In view of the increasing interest taken in the production of home-grown bulbs, growers are again being invited to exhibit at the Fortnightly Meeting to be held on Tuesday and Wednesday, August 29 and 30, 1933.

14. The Autumn Meetings, 1932.—Four special Autumn Meetings were held in 1932: for open-air plants and roses; for ornamental trees and shrubs; for fruit and vegetables; and for orchids, stove and greenhouse plants, and berried shrubs. These were all furnished with fine exhibits and were well attended. Although the number of exhibits at the Fruit and Vegetable Show was smaller than usual, there was nothing lacking in their quality.

15. The Autumn Meeting, 1933.—It has long been felt that it would be an advantage, especially for Fellows living at a distance from town, if these autumn meetings could be combined. The Council has been successful in obtaining the lease of the National Hall, Olympia, in 1933, and arrangements are being made to hold again one large combined Autumn Show on Wednesday, Thursday, and Friday, September 27, 28, and 29.

The competitive Fruit and Vegetable Show, however, will be held in the Society's Halls on Thursday and Friday, October 5 and 6.

16. Foundation Tablet.—*A bronze tablet, together with a bronze-framed illuminated record, stating that "At Messrs. Hatchard's in a house on this site the Royal Horticultural Society was founded on the 7th March 1804," was unveiled on March 7, 1932, by the President, the ceremony being attended by Members of the Council, Fellows of the Society, and friends, including Miss Ellinor Allen, the great-granddaughter of John Wedgwood, the founder, and Sir Ralph Wedgwood, a collateral descendant. The Council desires to record its thanks to Messrs. Hatchard for their co-operation in this matter.

17. Joint Committees.—The Council is pleased to report the formation of a Joint Committee with the British Delphinium Society for judging Delphiniums.

The formation of such Joint Committees has proved of great service to Horticulture by simplifying the system of giving awards to plants, and thus eliminating sources of confusion. The Joint Committees now comprise the following: Joint Dahlia Committee, Joint Delphinium Committee, Joint Iris Committee, Joint Rhododendron Committee, and Joint Sweet Pea Committee.

18. The Lily Committee and Conference.—The Lily Committee, which was formed towards the end of last year, has thoroughly justified its appointment. The Council has approved of the formation of a group of Lily enthusiasts within the body of the Society, and Fellows particularly interested in Lilies are asked to communicate with the Secretary of the Society. The preliminary arrangements for the Lily Conference are well in hand, and the abridged programme has been printed on the Fellows' Tickets.

19. The Lily Year-Book, 1932.—The Lily Year-book, published by the Society under the auspices of the Lily Committee in October, 1932, has met with a very cordial reception at home and abroad.

20. Fruit Conference, 1934.—Preparations are in hand for organizing a Fruit Conference in the year 1934, of which particulars will be published in due course.

21. Wisley : (a) The Garden.—As a result of the mild winter weather and the fine summer the collections generally have grown well.

During the year Rose borders have been laid out on each side of the new grass walk above the Rock Garden. These Rose borders take the place of the old Rose trial borders down by the farm, which were too far removed from the garden proper.

Numerous other alterations and improvements of a minor character have been carried out.

A large greenhouse has now been devoted to a mixed collection of flowering plants that would not prove quite hardy in the open, and has attracted considerable attention.

Thanks to the generosity of the members of the Lily Committee and others, many additional Lilies have been received, and the collection now embraces about sixty species and varieties.

A number of Rhododendrons have been added to the collection in the wild garden. From seeds received from the expeditions of the late Mr. G. Forrest and Captain Kingdon Ward, a number of plants have been raised of which it is hoped that some may be included in the distribution of surplus plants in 1934.

Among the plants of interest that have flowered during the year are :

Schima argentea.

Nomocharis Mairiei.

Caesalpinia pulcherrima.

Primula sonchifolia.

Primula eximia.

Wahlenbergia Mathewsii.

Gentiana saxosa.

Ourisia fragrans.

(b) Flower and Vegetable Trials.—The Trial of Sweet Peas, held for the first time at Wisley in conjunction with the National Sweet Pea Society, was a source of great interest to visitors.

Under glass the Trial of Perpetual Carnations has been cultivated in beds, adopting the practice of commercial growers.

* Designed by Mr. A. E. Henderson ; see JOURNAL, vol. 57, pt. ii.

Other floral trials carried out during 1932 were those of Stocks and of *Dianthus* (Annual and Perennial varieties).

The standard collections of herbaceous and other plants are annually increasing, and continue to prove of great value for purposes of comparison.

Vegetable trials carried out during the year consisted of Late Peas, Vegetable Marrows, Onions, Parsley, Radishes, and Early Cauliflowers.

(c) **Fruit for Commercial Purposes.**—Further varieties have been added to the trials of hardy fruits for commercial planting, conducted under a Joint Committee of the Society and Ministry of Agriculture and Fisheries. The propagation of new varieties of commercial promise for extended trial at the ten sub-stations has been continued. The crops of most varieties have again been excellent, and have attracted considerable interest among growers.

An illustrated report upon the behaviour of varieties at Wisley and at the sub-stations has been published in the JOURNAL, vol. 57, pt. ii.

(d) **Investigations and Experiments : Plant Physiology.**—Dr. Tincker has continued the study of the effect of various periods of light on the growth of garden plants, paying particular attention to the phenomenon of bolting in lettuce varieties. The influence of soil conditions upon the growth of Gentians and other plants is under continued observation. Further progress has been made in the study of the germination of rosaceous and other seeds. In connexion with the work of the Lily Committee, soil samples and reports on soils from a number of British gardens have been examined.

Entomology.—Mr. Fox Wilson has obtained records for a further season upon the pollinators of fruit trees. The investigation of the Stem Eelworm of Phlox has been extended in view of cross-infection from herbaceous Phlox to other plants belonging to the same Natural Order. The study of the incidence of attacks made by insects of the local fauna upon recently introduced garden plants has been continued, as well as that of the pests of seeds, especially with regard to the *Bruchidae*. The parasite of the Greenhouse White Fly has been widely distributed to Fellows and other applicants.

Mycology.—Mr. Green has continued observations upon Black Spot of Roses, and upon a Smut Disease of Dahlias. Reports on these investigations have been published in the Society's JOURNAL. The "ink" disease of *Iris reticulata*, and a previously unrecorded disease of Lupins, are under investigation.

Narcissus Investigations.—Mr. Gould has continued the experiments to determine the effects of hot-water treatment of eelworm and narcissus fly, and the experiments on the control of the basal rot of Narcissus. A lecture dealing with results obtained in these investigations will be given to Fellows of the Society early in 1933.

Exhibits of fungus diseases and insect pests have been staged by the Mycologist and Entomologist at various shows of the Society, and information thereon has been given to enquirers.

During the year the Society has been glad to provide laboratory accommodation for Professor F. E. Weiss, F.R.S., President of the Linnean Society. Professor Weiss is investigating problems concerning the early growth of Gentians.

With deep regret the loss of the Society's Chemist, Dr. F. V. Darbishire, who died suddenly in March, is recorded. Dr. Darbishire, a graduate of Oxford and Leipzig, served the Society for fourteen years. His published work included a translation of the correspondence of Faraday and Schonbein, and Berzelius and Schonbein—of much interest at the recent Faraday centenary celebrations. His other work, on green manuring, in collaboration with Dr. Page, and on the reaction of the colour of floral petals to varying acidity, in collaboration with Mr. Buxton, appears in the Society's JOURNAL, the Journal of Genetics, and elsewhere.

(e) **School of Horticulture.**—The introduction of Student Gardeners possessing some years of experience gained in good gardening establishments is proving satisfactory. The men show enthusiasm in their duties and in their class work. The Council has pleasure in acknowledging an anonymous gift of prizes to be called the "J. K. Ramsbottom" Prizes, to be given for an English composition essay on a horticultural subject, and competed for annually by the Student Gardeners at Wisley.

(f) **Demonstrations of Garden Operations.**—Arrangements have been made for demonstrating garden operations in the coming year for the benefit of the Fellows: seed sowing in and out of doors, and Rose pruning in March; spring spraying of fruit trees in April; summer pruning fruit trees in July; pruning fruit trees in October; and planting fruit trees and Roses in December.

REPORT OF THE COUNCIL FOR THE YEAR 1932. lxxxii

22. **Masters Memorial Lectures.**—The Council desires to record its thanks to Sir Frederick Keeble, F.R.S., who delivered the Masters Memorial Lectures on May 10 and 11 on "Garden Fertility: Its Origin and Maintenance." The Masters Memorial Lectures in 1933 will be given on Tuesday and Wednesday, July 18 and 19, when Professor V. H. Blackman, F.R.S., will speak on "Plants in Relation to Light and Temperature."

23. **Expeditions.**—The Society has taken shares in two expeditions in search of new and rare plants, namely: Miss D. B. Stafford's expedition to the highlands of Peru and Bolivia, and the expedition to Tibet planned by Captain F. Kingdon Ward for 1933.

24. **The Society's Publications.**—The Society's publications in 1932 have been more numerous than usual. Besides the three parts of "Curtis's Botanical Magazine" (completing vol. 155), there have appeared "Conifers in Cultivation," being the report of the Conifer Conference (1931); the monograph on "Sempervivums," by Dr. Lloyd Praeger; the "Lily Year-book, 1932"; the "List of Awards to Decorative Plants, Fruits and Vegetables, 1927-31"; and the "List of Awards to Orchids, 1927-31"; a pamphlet on the "Cultivation of Early and Late Salad Crops for Market Purposes," and one on "Autumn Sown Vegetables," all of which have been well received.

The "Classified List of Daffodils" is under revision, and a "Daffodil Year-book" is being compiled for publication in the autumn of 1933.

25. **Lindley Library.**—During the year 1932 about 280 books, pamphlets, etc., have been added to the Lindley Library, among which special mention may be made of: Alpino's "Rerum Aegyptiarum," Bouloumey's "Flore du Liban et de la Syrie" (2 vols.), De Bry's "Anthologia Magna," Hoffy's "Orchardist's Companion," Jellicoe's "Baroque Gardens of Austria," Krafft's "Plans des plus beaux jardins pittoresques de France," etc. (2 vols.), "Loudon's Hints on the Formation of Gardens and Pleasure Grounds," "Portefeuille des Horticulteurs" (2 vols.), Printz's "Vegetation of the Siberian-Mongolian Frontiers," Redouté's "Unpublished Aquatint Botanical Plates" (32), Saint-Sauveur's "Les beaux Jardins de France," "The Ornamental Flower Garden and Shrubbery" (4 vols.).

26. **The Victoria Medal of Honour.**—The Victoria Medal of Honour has been awarded to Sir William Lobjoit for his public services on behalf of Horticulture; to Mr. F. W. Millard, who has introduced to cultivation so many new flowering plants; to Mr. E. A. L. Laxton for his work in raising and introducing new fruits; and to Mr. D. Bliss for his work in connexion with the Public Parks and Gardens of Swansea.

27. **The Associateship of Honour.**—The Associateship of Honour has been conferred on Mr. W. G. Baker, Curator of the Botanic Garden, Oxford; Mr. J. S. Chisholm, Head of the Department of Horticulture in the Edinburgh and East of Scotland College of Agriculture; Mr. Wm. Craven, Head Gardener to the Weymouth Corporation; Mr. E. Gibson, of the Headquarters Staff of the London County Council Parks Department; Mr. Wm. Hales, A.L.S., Curator of the Chelsea Physic Garden; Mr. F. Horwood, M.M., Foreman to Messrs. Kelways, Ltd.; Mr. J. Jones, Head Gardener to Mr. R. J. Corbett, of Ynys-y-Maengwyn, Townyn; Mr. F. R. Long, Superintendent of Public Parks, Port Elizabeth, South Africa; Mr. D. McInnes, Head Gardener to the Earl of Strathmore, Glamis Castle; Mr. P. Mann, Horticultural Instructor and Adviser to the Buckingham County Council (retired); Mr. E. Markham, Head Gardener to Mr. Wm. Robinson, of Gravetye Manor, East Grinstead; Mr. H. Markham, Head Gardener to the Earl of Strafford, Wrotham Park; Mr. G. Taylor, Head Gardener to Sir John Ramsden, Bt., at Bulstrode Park; Mr. G. M. Taylor, of Messrs. Dobbie & Co., Ltd.; Mr. F. Troughton, Nursery Manager to Messrs. J. H. White & Co., Ltd.; Mr. A. E. Vasey, of Messrs. Carter Page & Co., Ltd.; and Mr. C. F. Wood, Gardener to Mr. E. M. Preston, of The Warren, Hayes.

28. **The Lawrence Medal.**—The Lawrence Medal for the best exhibit staged at the Society's Shows during the year has been awarded to Messrs. Dobbie & Co., Ltd., for their exhibit of annuals and biennials staged on July 19, 1932.

29. **The Holford Medal.**—The Holford Medal for the best exhibit of plants and/or flowers (fruit and vegetables excluded) shown by an amateur during the

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year in the Halls of the Society has been awarded to Sir Jeremiah Colman, Bt., V.M.H., for his exhibit of Orchids staged on April 5, 1932.

30. **The Vetch Memorial Medals.**—Awards have been made as follows: Gold Medal to Sir Frederick Moore, V.M.H., for his services to Horticulture. Gold Medal to Lieut.-Colonel Sir David Prain, V.M.H., for his services to Horticulture. Silver Medal and £50 to Dr. Lloyd Praeger, for his work on Sempervivums.

31. **The Cory Cup.**—The Cory Cup has been awarded to Mr. Lionel de Rothschild, V.M.H., for his Rhododendron 'Romany Chai,' shown on June 21, 1932, which was judged to be the best new hardy plant of garden origin shown to the Society in the course of the year.

32. **The Loder Rhododendron Cup.**—The Loder Rhododendron Cup has been awarded to Mr. Harry White, of the Sunningdale Nurseries, in recognition of his work in the propagation and cultivation of Rhododendrons.

33. **The George Moore Medal.**—The George Moore Medal has been awarded to Dr. Craven Moore for Cypripedium 'Pickwick,' shown on December 13, 1932, which was considered the best new Cypripedium shown to the Society in the course of the year.

34. **The Sander Medal.**—The Sander Medal has been awarded to Mr. R. Paterson for *Miltonia* 'Mrs. J. B. Crum' var. 'Chelsea,' shown at the Chelsea Meeting, 1932, which was considered to be the best new greenhouse plant shown to the Society in the course of the year.

35. **The Williams Memorial Medals.**—The Williams Memorial Medals for the best groups of plants and/or cut blooms of one genus (fruit and vegetables excepted) which show excellence in cultivation, exhibited during the year, have been awarded to Mr. J. L. Richardson for his exhibit of Daffodils staged on April 14, 1932, and to Messrs. Blackmore & Langdon for their exhibit of Begonias staged on September 20, 1932.

36. **The Sherwood Cup.**—The Sherwood Cup for the most meritorious exhibit at the Chelsea Meeting was awarded to Messrs. R. W. Wallace & Co., Ltd., for a mixed group of Rhododendrons, Azaleas, and bulbous plants, Lilies being the outstanding feature.

37. **The Coronation Cup.**—The Coronation Cup for the best exhibit of any plant or plants other than Roses on the occasion of the Autumn Show of Open-air Plants was awarded to Messrs. Dobbie & Co., Ltd., for their exhibit of Dahlias.

38. **Gifts to the Society.**—The Council desires to record its grateful thanks to Lady Algernon Gordon-Lennox for presenting miniature cups to be given to the gardeners of the winners of the Gordon-Lennox Cup, to Mrs. Holmes for a cup for Orchid species (won by Sir Jeremiah Colman, Bt.), and to Mr. K. D. Corsar for a cup for Auriculas (won by Mr. Clive Cookson); to the Director of the Royal Botanic Gardens, Kew, for plants for the temperate house; to Sir Oscar Warburg for a collection of *Cistus* species; to the President and Mr. J. B. Stevenson, for gifts of Rhododendrons and other plants; to Mr. R. D. Trotter for Crocus species; to Messrs. R. H. Bath, Ltd., G. Bunyard & Co., Ltd., Dobbie & Co., Ltd., W. Fromow & Sons, and Geo. Jackman & Son, for gifts of trees and shrubs; and to numerous other Fellows and friends at home and abroad for seeds and plants; to Sir Daniel Hall for the four volumes of "The Ornamental Flower Garden and Shrubbery"; and to the publishers and others for gifts of books to the Lindley Library.

39. **Retiring Members of Council.**—The Council desires to record with appreciation and gratitude the valuable services rendered to it by the retiring members of the Council, Mr. E. A. Bowles, Mr. Wm. Cuthbertson, and Mr. J. B. Stevenson. It is a matter of great satisfaction to know that the committees on which they have worked will still continue to have their help and advice.

40. **The Press.**—The Council wishes to repeat its expression of thanks to the Press for unflinching support, goodwill, and kindly interest in the affairs of the Society.

REPORT OF THE COUNCIL FOR THE YEAR 1932. lxxxiii

41. **Committees and Judges.**—The Society's best thanks are accorded also to the members of its Committees and to the judges who are ever willing to come and assist the Society in its work, in spite of the heavy calls thus made upon their time.

42. **Staff.**—The Council desires to take this occasion to thank, on behalf of the Society, the Secretary and the administrative staff, for the loyal and efficient way in which they have carried out their duties.

Signed on behalf of the Council,
HENRY McLAREN,
President.

December 31, 1932.

Dr.

REVENUE & EXPENDITURE ACCOUNT

To ESTABLISHMENT EXPENSES—LONDON.		£	s.	d.	£	s.	d.
Rent, Rates, and Taxes		3,095	2	8			
Salaries and Wages		7,696	17	0			
Other Establishment Expenses, including Light, Fuel, Stationery, Professional Fees, Repairs and Renewals, and Interest . .		4,551	2	0	15,343	1	8
„ WISLEY—							
Net expenditure for Year, as per Separate Account					12,622	14	8
„ PRINTING AND POSTAGE OF JOURNAL AND OTHER PUBLICATIONS		3,977	12	2			
Less Sales and Advertisements		1,715	2	7	2,262	9	7
„ STAFF PENSIONS		1,006	2	0			
Less contributions by Staff, as per Scheme . .		425	14	0	580	8	0
„ MEETINGS—							
Expenses and Labour of Special and Other Meetings		3,766	6	3			
Less Receipts		466	19	8			
		3,299	6	7			
Spring Meeting:							
Expenses and Labour	£5,919 3 2						
Sums allocated for Over- head Expenses	500 0 0						
	6,419 3 2						
Less Receipts	5,217 4 10				1,201	18	4
					4,501	4	11
„ CUPS AND MEDALS					308	4	2
„ CONTRIBUTION TO LINDLEY LIBRARY—							
Purchase of Books		478	17	10			
Expenses as per Trust Account		324	17	9	803	15	7
„ SPECIAL EXPENDITURE—							
F. Kingdon Ward Expedition		105	0	0			
E. K. Balls Expedition		20	0	0			
Miss D. Stafford Expedition		15	0	0			
Donation Royal Geographical Society		10	0	0			
„ British Colour Council		5	5	0			
„ London Children's Gardens		10	10	0			
„ Gardeners' Royal Benevolent Inst. . . .		52	10	0			
„ Royal Gardeners' Orphan Fund		21	0	0			
„ Swanley Horticultural College		25	0	0			
„ Imperial Fruit Show		10	10	0			
„ Cypher Memorial Fund		10	0	0			
Pritzel Revision (Index Londinensis) . . .		354	15	0			
Conifer Conference Report		787	2	11			
Sempervivum Monograph		179	17	8	1,606	10	7
„ BOTANICAL MAGAZINE					815	14	2
„ SCHOLARSHIPS:—							
R.H.S. Working Scholarships					186	5	0
„ EXAMINATIONS IN HORTICULTURE—							
Expenses		447	14	7			
Less Fees		396	13	0	51	1	7
„ DEPRECIATION AND RENEWALS FUND (FURNI- TURE AND APPLIANCES)					2,255	9	1
„ OLD AND NEW HALLS SINKING FUND APPRO- PRIATION					980	0	0
„ RESTAURANTS—							
Proportion of Overhead Expenses		796	16	4			
Deficit		180	15	0	977	11	4
„ BALANCE being Excess of Revenue over Expen- diture carried to Balance Sheet					5,189	12	0
					£48,484	2	4

FOR YEAR ENDED 31st DECEMBER, 1932.

Cr.

	£	s.	d.	£	s.	d.
By ANNUAL SUBSCRIPTIONS				41,293	16	5
„ ENTRANCE FEES				10	10	0
„ DIVIDENDS AND INTEREST	566	2	11			
„ Do. Do. DAVIS TRUST	51	8	10			
				617	11	9
„ HALL LETTINGS, Gross				5,888	10	6
„ LIFE COMPOSITIONS— Being amount paid by Fellows who have died during the year				393	15	0
„ RENT OF FREEHOLD PROPERTY (WISLEY)				250	8	0
„ GARDEN INSPECTIONS— Receipts Less Expenditure				29	10	8

£48,484 2 4

Dr.

ROYAL HORTICULTURAL SOCIETY—**LIABILITIES.**

	£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT, 31st December, 1931	231,854	14	2			
<i>Add</i> Amount transferred from Wisley Capital Funds Account	534	2	10			
				232,388	17	0
„ LIFE COMPOSITIONS, 31st December, 1931	13,776	0	0			
<i>Less</i> Fees paid by Fellows who have died during the year	393	15	0			
				13,382	5	0
<i>Add</i> Life Compositions paid during the year	325	10	0			
				13,707	15	0
„ SUNDRY CREDITORS—						
On Open Accounts	2,170	4	1			
Westminster Bank Ltd.	5,261	7	6			
				7,431	11	7
„ APPROPRIATION TO DEPRECIATION AND RENEWALS FUNDS AWAITING INVESTMENT				2,505	9	1
„ SUBSCRIPTIONS PAID IN ADVANCE				773	19	2
„ DEPRECIATION AND RENEWALS FUND—						
31st December, 1931	7,744	10	11			
<i>Added</i> to Fund, 1932	2,255	9	1			
				10,000	0	0
„ OLD AND NEW HALLS SINKING FUND				4,329	15	5
„ WEATHER INSURANCE FUND				3,000	0	0
„ SUPPLEMENTARY PENSION FUND				1,595	10	0
„ MEMORIAL AND OTHER TRUST FUNDS—						
Balances in hands of Society as per separate Schedule				427	0	2
„ REVENUE AND EXPENDITURE ACCOUNT—						
Balance as per Revenue and Expenditure Account, 31st December, 1932				5,189	12	0

£281,349 9 5

BALANCE SHEET, 31st DECEMBER, 1932.

Cr.

ASSETS.						
	£	s.	d.	£	s.	d.
By CAPITAL EXPENDITURE—						
Old Hall, Offices, Restaurant, Library and Equipment, 31st Dec., 1931	77,571	19	0			
Additions during 1932	27	15	0			
				77,599	14	0
New Hall, Restaurant and Equipment				167,655	7	10
					245,255	1 10
„ FREEHOLD PROPERTY, WISLEY—						
31st December, 1931				13,088	2	11
Add Purchase of Land during 1932				15	0	0
					13,103	2 11
„ BOTANICAL MAGAZINE—						
Stock				100	0	0
Work in advance				611	14	4
					711	14 4
„ DEPRECIATION AND RENEWALS FUND INVEST- MENTS AT COST				7,744	10	11
(Market value of Investments at 31st December, 1932, £9,455 10s. 10d.)						
Add Appropriation awaiting Investment				2,255	9	1
					10,000	0 0
„ OLD AND NEW HALLS SINKING FUND INVEST- MENTS AT COST				3,172	0	11
Add Investments during the year				1,157	14	6
					4,329	15 5
(Market value of Investments at 31st December, 1932, £5,471 2s. 7d.)						
„ WEATHER INSURANCE FUND INVESTMENTS AT COST					3,000	0 0
(Market value of Investments at 31st December, 1932, £3,020 15s. 3d.)						
„ SUPPLEMENTARY PENSION FUND INVESTMENTS AT COST				1,284	10	10
Add Investments during the year				310	19	2
					1,595	10 0
(Market value of Investments at 31st December, 1932, £1,945 0s. 9d.)						
„ WISLEY ADJUSTMENT ACCOUNT					219	7 2
„ SUNDRY DEBTORS AND PAYMENTS IN ADVANCE					2,430	12 10
„ CASH AT BANK AND IN HAND					704	4 11
					£281,349	9 5

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position of the Society on the 31st December, 1932. In the total of Assets, £281,349 9s. 5d., are included Investments, Cash and Appropriations amounting in all to a total sum of £19,352 5s. 7d., representing Depreciation and other Funds which are not available for the general purposes of the Society.

J. S. FEATHER, F.C.A., Auditor
(HARPER, FEATHER & PATERSON, Chartered Accountants),
35 Great Tower Street, London, E.C. 3.

5th January, 1933

Dr.

WISLEY GARDENS—BALANCE

LIABILITIES.						£	s.	d.	£	s.	d.
To CAPITAL FUNDS ACCOUNT—											
31st December, 1931						36,635	8	10			
Less Amount transferred to Vincent Square Capital Funds Account						534	2	10			
						<hr/>					
						36,101	6	0			
Less Decrease						230	18	4			
						<hr/>			35,870	7	8
„ VINCENT SQUARE ADJUSTMENT ACCOUNT									219	7	2
„ ENDOWMENT TRUST FUND									23,342	7	11
(The difference between this Fund and the Investment Account on the Assets side is due to a change in the Investments which was made in 1921 and to the writing off of the City of Moscow 4½% 1912 Loan.)											
„ DEPRECIATION AND RENEWALS FUND—											
As at 31st December, 1931						6,361	19	3			
Added to Fund, 1932						250	0	0			
						<hr/>			6,611	19	3

£66,044 2 0

ASSETS.

	£	s.	d.	£	s.	d.
By CAPITAL EXPENDITURE—						
Laboratory, Dwelling Houses, Glass Houses, Ranges, etc.				33,371	10	10
N.B.—The Hanbury Trust Estate is, under the Trust Deed, vested in the Society only so long as it is in a position to use it as an Experimental Garden. Accordingly the Expenditure thereon by the Society is an Asset only so long as the Gardens continue to be used by the Society.						
„ FUEL STOCK				44	0	0
„ MOTOR CAR AND LORRY				5	0	0
„ PLANT, LIVE STOCK, AND LOOSE EFFECTS, as valued by the Director—						
31st December, 1931	3,039	13	6			
Add Purchases during the Year	602	12	9			
				3,642	6	3
Less Sales	£534	2	10			
„ Loss thereon	230	18	4			
„ Depreciation of Garden and Laboratory	269	5	8			
				1,034	6	10
					2,607	19 5
„ LIBRARY—						
31st December, 1931	497	17	2			
Additions during the year	42	0	1			
					539	17 3
„ ENDOWMENT TRUST FUND INVESTMENTS				22,803	15	3
(Market value of Investments at 31st Dec., 1932, £22,182 13s. 11d.)						
„ DEPRECIATION AND RENEWALS FUND INVESTMENTS AT COST	6,361	19	3			
(Market value of Investments at 31st Dec., 1932, £8,108 19s. 3d.)						
Add Appropriation awaiting Investment	250	0	0			
					6,611	19 3
					£66,044	2 0

I have audited the books from which the foregoing Accounts are compiled, and certify that they exhibit a true and correct statement of the position on the 31st December, 1932. In the total of Assets, £66,044 2s. 0d., are included Investments and an Appropriation amounting in all to a total sum of £29,475 14s. 6d., representing Endowment and Depreciation Funds which are not available for the general purposes of the Society.

J. S. FEATHER, F.C.A., Auditor

(HARPER, FEATHER & PATERSON, Chartered Accountants),

35 Great Tower Street, London, E.C. 3.

5th January, 1933.

ROYAL HORTICULTURAL SOCIETY—TRUST

	Amount of Fund represented by Investments at Cost.			Income Balance in hand 31st Dec. 1931.		
	£	s.	d.	£	s.	d.
1. ALFRED DAVIS TRUST FUND . . .	946	0	3	<i>nil</i>		
2. WILLIAMS MEMORIAL FUND . . .	245	11	9	14	1	9
3. MASTERS MEMORIAL FUND . . .	542	17	0	134	10	10
4. NICHOLSON MEMORIAL FUND . . .	180	14	4	<i>nil</i>		
5. SCHRÖDER PENSION FUND . . .	557	14	6	6	6	8
6. LINDLEY LIBRARY TRUST . . .	11,932	8	7 (a)	<i>nil</i>		
7. SIR JAMES KNOTT TRUST . . .	600	0	0	42	0	0
8. VEITCH MEMORIAL TRUST FUND . .	1,673	19	1	157	13	2
9. MOORE MEDAL TRUST FUND . . .	190	10	6	16	15	11
10. SEWELL MEDAL TRUST FUND . . .	500	0	0	<i>nil</i>		
11. MRS. A. SHERMAN HOYT PRIZE FUND .	207	7	10	12	5	7
12. LORD RIDDELL TROPHY FUND . . .	175	0	0	<i>nil</i>		
13. DEDICATIONS VOLUME FUND (Botanical Magazine) . . .	112	0	0	<i>nil</i>		

Notes on above Funds :

1. Bequeathed to the Society in 1870 for Annual prizes or any other object the Council may determine.

2. Raised by donations in 1891 in memory of the late Mr. S. B. Williams towards the provision of prizes and medals.

3. Raised by donations in 1908 in memory of the late Dr. Masters towards the provision of one or more annual lectures.

4. Raised by donations in 1908 in memory of the late Mr. Geo. Nicholson to provide prizes for Wisley Students.

5. Provided by the Society in memory of the late Baron Schröder to pay to the Gardeners' Royal Benevolent Institution for one pension.

6. The nucleus of the Library is the fine collection of books and pamphlets which belonged to the late Dr. Lindley. It has since been added to by the books purchased by the Society, and by the gifts of private donors.

FUND ACCOUNTS, 31st DECEMBER, 1932.

Dividends and Interest received during 1932.	Expenditure in 1932 in accordance with the Trust.	Income Balance in hands of R.H.S. 31st Dec., 1932.	
£ s. d.	£ s. d.	£ s. d.	£ s. d.
51 8 10	51 8 10	<i>nil</i>	(a) Investment . 1,458 15 7
9 17 5	9 10 0	14 9 2	Cost of Books
12 10 0	20 0 0	127 0 10	purchased by
7 8 6	7 8 6	<i>nil</i>	the Society up
20 0 0	20 0 0	6 6 8	to 31st Dec.,
336 5 2 (b)	336 5 2	<i>nil</i>	1931 . . . 9,994 15 2
27 4 3	<i>nil</i>	69 4 3	Books purchased
83 13 11	59 18 0	181 9 1	by the Society
8 9 6	10 1 6	15 3 11	in 1932 . . . 478 17 10
25 3 0	25 3 0	<i>nil</i>	
10 8 0	9 18 6	12 15 1	
8 2 8	7 11 6	11 2	
<i>nil</i>	<i>nil</i>	<i>nil</i>	
			<u>£11,932 8 7</u>
Total as per Balance Sheet .	£427 0 2		(b) Includes contribution by the Society in 1932, £324 17s. 9d.

7. Presented to the Society in 1920 by Sir James Knott for the purpose of providing a scholarship tenable at Wisley.

8. Instituted in 1870 in commemoration of the late Mr. James Veitch for the encouragement of Horticulture. Fund vested in the Society in 1922.

9. Presented to the Society in 1926 by the late Mr. G. F. Moore to provide a medal annually for the best new *Cypripedium* shown to the Society during the year.

10. Presented to the Society in 1928 by the late Mr. A. J. Sewell to provide medals for Rock Garden Plants.

11. Presented by Mrs. A. Sherman Hoyt in 1929 as a donation and funded by the Society to provide prizes for the encouragement of the growth of Cacti and Succulents.

12. Presented by Lord Riddell in 1931 to provide a trophy annually to be awarded for vegetables.

13. Proceeds of the sale of Curtis's Botanical Magazine Dedications, 1827-1927, presented in 1932 to the Society by Mr. William Cuthbertson, V.M.H., to be devoted to publications.

SCIENTIFIC COMMITTEE.

September 6, 1932, Mr. F. J. HANBURY, F.L.S., V.M.H., in the Chair, and six other members present.

Salix, British species.—Mr. Fraser showed a number of dried specimens of British species of *Salix* mainly related to *Salix acuminata* which Dr. Floderus has recognized as belonging to *S. dasyclada* and *S. stipularis*, including a form from Messrs. Hillier's nursery which may be a hybrid with the last species as one parent.

Tetraploid Tomatos.—An exhibit was before the Fellows from the John Innes Horticultural Institution illustrating various forms of Tomato (with tetraploid constitution), mainly with thick flesh and few seeds. The Committee desired that thanks should be accorded to the Institution for the exhibit which it hoped to have another opportunity of seeing.

Cucumber with lateral proliferation.—Mr. Treseder of Cardiff sent a cucumber which had produced a lateral leafy growth from the side of the fruit in the axil of which there appeared to be a small bud. Mr. Hales took the specimen in the hope that he might be able to grow it.

Canterbury Bells.—Mr. Chittenden showed branches of Canterbury Bells from his garden at W. Clandon, attempting to flower for the second time this year, and bearing flowers not quite half an inch in diameter with the corolla split to the base. The first flowers were all normal.

September 20, 1932, Mr. G. W. E. LODER, M.A., F.L.S., in the Chair, and eight other members present.

The illness of the Chairman.—Mr. Loder said that the Council had just received the resignation of Sir David Prain from all Committees to take effect at the end of the year, and this the Committee learned with great regret. The news of his improvement in health was received with pleasure.

Salix hybrids.—Mr. Fraser showed dried specimens of hybrids of *Salix atrocinerea* and *S. nigricans* to show the great variation within the range of this cross.

Pollination in Pears.—Mr. C. H. Hooper reported his experiments in pollination of pears carried out at Faversham this year. A small number of flowers was dealt with as a rule and most varieties proved more or less self-fertile but neither 'Glou Morceau' nor 'Pitmaston Duchess' set fruit unless hand-pollinated.

Virescent Hydrangea.—Mr. Loder showed an inflorescence of *Hydrangea* in which all the sepals had been green from the beginning of flowering, not only at the end as is usual.

September 27, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and five other members present.

Resignation of the Chairman.—It was agreed that a letter expressing the regret of the Committee at the resignation of its Chairman, Sir David Prain, and its sense of the loss thereby should be sent to him over the signatures of the Vice-Chairmen.

Salix repens.—Mr. Fraser showed *Salix arenaria*, which name Dr. Floderus had given for *S. repens* from Putney Heath, and some plants which he regarded as hybrids, with that as one of the parents.

Bodies found on Phyllostachys nigra.—Mr. Honess, of Walhampton, Lymington, sent an inflorescence of the bamboo, *Phyllostachys nigra*, and some round bodies, evidently galls, which have been found in quantity on the tips of growths of that species. Dr. Rendle took them for examination at the British Museum.

Buddleia sp.—Inflorescences of a *Buddleia* from Mr. W. Butt, of Hyde Lodge, Chalford, were sent from Floral Committee B for identification. They had been received under the name of *B. Forrestii* and were referred to the Secretary for examination.

October 11, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and eight other members present.

Wireworms.—Mr. Fraser recounted his experience on the cannibalistic propensities of wireworms. He had enclosed four in a tin box and found that one had devoured the others and finally its own cast skin, and had apparently thriven upon this diet.

Hybrid Salices.—Mr. Fraser also showed a series of hybrids of *Salix triandra* and *S. viminalis*, including the forms known as *hippophaefolia* and *Trevirani*, and made remarks upon the variations in them.

A new genus of Leguminosae.—Mr. E. Baker showed drawings of a new genus, *Dalbergiella*, of Leguminosae which he had recently described, to include a plant from Nyassa allied to *Dalbergia*.

Artemisia maritima and *A. gallica*.—Mr. Baker also showed specimens of two allied forms of *Artemisia* collected in Norfolk, to draw attention to the restriction of the plants to well-defined areas within a short distance of one another.

Galls.—The galls shown at the last meeting had proved to be oyster galls from the oak, produced by *Andricus ostrea* on the oak leaves. The sender had subsequently discovered that they had fallen from an oak above the *Phyllostachys* in the garden at Walhampton.

Buddleia Forrestii.—The specimens of *Buddleia* received at the last meeting had shown considerable variations from the characters given in the original description of that plant and from Forrest's original gatherings, but on examination of the specimens at Edinburgh it was found that seedlings showed variations (though not always combined in the one plant) in the same directions as those seen in the specimens.

Aberrant Rhododendron growth.—Lady Derby sent shoots from the lower part of a bush of *Rhododendron Loderi* at Camberley, showing foliar development at the apices of the scales of buds and the emergence of the somewhat crippled buds from the abnormally developed and constricted margins of the scales. The leafy part was much rounder and more rugose than is usually seen in the foliage of *R. Loderi*.

Sectional chimera in Apple.—An Apple ('King of the Pippins') grown near Gravesend was shown with approximately two-fifths of the surface brilliant red without stripes, the remainder the normal yellow of that variety, the line of demarcation being very sharp.

The late Sir Everard im Thurn.—The Committee heard with regret of the death of Sir Everard im Thurn, who had been for many years a regular attendant at its meetings, and desired the Secretary to convey its condolences to Lady im Thurn.

October 25, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and five other members present.

Nymphaea propagation.—Mr. Amos Perry sent examples of propagation of *Nymphaeas* from flowers. The flowers of the variety 'Col. Walsh' had been pegged down and had produced buds from the flowers. No seed was produced by this variety.

Colchicum from Lebanon.—Major Pam sent a small-flowered *Colchicum* for naming, flowering with the leaves—probably *C. Ritchei*.

November 22, 1932, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and nine other members present.

Salix arenaria.—Mr. Fraser showed a great number of specimens of plants under this name and said there was a doubt as to the identity of plants so named since the characters of the style were different from those originally described.

Manures (?) offered for sale.—Dr. Voelcker drew attention to a mixture recently offered for sale at £5 10s. a ton as manure, which proved to contain a very high percentage of iron filings, of no manurial value whatever.

Aberrant Poppy.—Mr. Worsdell showed a curious Poppy from Church Oakley, Norfolk, a form of *Papaver nudicaule*, in which the persistent calyx was enlarged and separated from the rest of the flower by a long internode, occupying the position usually occupied by the bracteoles.

December 13, 1932, Mr. F. J. HANBURY, F.L.S., V.M.H., in the Chair, and four other members present.

Fruits of Cycas revoluta.—Mr. Wood, of Hayes, showed from the greenhouse of Mrs. Romell, Orchard House, Goodlands Road, Bickley, some fruiting leaves of *Cycas revoluta*.

Lilies and soil.—Dr. Tincker drew attention to the good growth of *Lilium Szovitsianum* in two types of soil which had recently been sent to him, one acid, the other distinctly alkaline in reaction.

Salix herbacea.—Mr. Fraser showed dried specimens of *Salix herbacea* from its most southern habitat in the British Isles, Brecknock Beacon, and the hybrid *S. repens* × *S. herbacea* from Glen Shee and the Spital of Glen Shee.

Stoloniferous Rhododendron.—Mr. Comber, of Nymans Gardens, Handcross, sent an underground stolon of *Rhododendron pemakoense* to draw attention to the method of increase of this species, a method unknown in any other.

Fruit of Ficus stipulata.—Mr. Braggins sent a fruiting branch of *Ficus stipulata* from La Mortola to illustrate the remarkable difference in the foliage of the vegetative and fertile branches of this plant.

January 10, 1933, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and eleven other members present.

Lutein.—Prof. Armstrong referred to the discovery of the identity of the chief constituent of the yellow colouring of egg yolk with the yellow constituent of chlorophyll and to the fact that carotin occurs in the green leaf but apparently not in the hen's egg.

Effect of hormones on plant growth.—Dr. Tincker mentioned a report in The Lancet of the increased growth and flowering of plants which had been supplied with the hormone estoria derived from animal sources.

Forms of seedlings of British plants.—Mr. Fraser showed a number of seedlings which he had mounted by placing them upon the paper and fixing them with stickphast while still green, drying them subsequently. By this means they had retained their form. They illustrated the seedlings of various Ranunculaceae, Berberidaceae, Cruciferae, Malvaceae, Viola, Impatiens, Euonymus, Genista, Ulex, and Medicago.

Forsythia fasciated.—Mr. Odell showed a shoot of *Forsythia suspensa* fasciated, produced during the past season.

January 24, 1933, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and eight other members present.

Willow Rose Gall.—Mr. Fraser showed a gall on *Salix Caprea* caused by *Cecidomyia salicis* which took the form of a rosette of leaves at the end of a twig and which is commonly known as the rose-gall.

Salix sp.—Mr. Fraser also showed a series of specimens to illustrate the difference between *Salix cinerea* which does not occur in Great Britain, and *S. atrocinerea* which is common in Britain, France and the Iberian Peninsula. The difference lies in the possession of dark hairs on the foliage in *S. atrocinerea*. Mr. Fraser pointed out that this species has varieties parallel to those of *cinerea* on the Continent.

February 7, 1933, Mr. A. D. COTTON, F.L.S., in the Chair, and seven other members present.

Lobelia Deckenii, etc.—Mr. E. G. Baker showed a specimen of the tall *Lobelia Deckenii* from an elevation of 11,000 ft. on Mt. Kilimanjaro, where it attains a height of 12 ft. He also showed a species of *Crotalaria* which is thought to be useful as a smother crop in the cultivation of sisal, and of a small species of *Trifolium* (*T. kilimanjaricum*) from Mt. Kilimanjaro where it grows at an elevation of 5,000 ft.

Prunus crosses.—Mr. Crane showed a series of crosses of species of *Prunus*, among them *Prunus cerasifera* × *P. domestica*, which makes a large tree growing more rapidly than either of its parents, and *spinosa* × *institia*, which possibly occurs wild in Denmark.

Seedlings of British plants.—Mr. Fraser showed seedlings of the following British plants beautifully prepared and mounted: *Rubus laciniatus*, *Pyrus Aria*, *Ribes Grossularia*, *Epilobium montanum*, *E. Lamyi*, *Circaea lutetiana v. cordifolia*, *Oenothera biennis*, *Sison Anomum*, *Chaerophyllum temulum*, *Anthriscus sylvestris*, and *Archangelica officinalis*.

Seedling Avocado Pear.—Mrs. Jeffrey sent a drawing of an Avocado Pear growing in a jar of water over which the seed had been suspended. The plant had reached 27 inches in height.

Plants from Floral Committee.—Dame Alice Godman sent a species of *Babiana* from S. Africa, which was taken by Mr. Cotton for further examination, and Sir William Lawrence a S. American plant under the name of *Zephyranthes* which was reserved for further examination.

February 21, 1933, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and seven other members present.

Plants.—The two plants shown at the last meeting had been identified as *Babiana flabellifolia* and *Griffinia Blumenavia* (from Brazil).

Seedlings of British plants.—Mr. Fraser showed a further series of seedlings of British plants, and drew attention to the characters of the cotyledons in relation to the seed. Among them were *Hedera Helix*, *Viburnum Lantana*, *Senecio vulgaris*, *Cornus sanguinea*, *Scabiosa columbaria* and its varieties, *Bidens tripartita*, *Artemisia vulgaris*, *Senecio squalidus*, *S. Jacobaea*, *Carduus crispus*, *Centaurea nemoralis*, *Lapsana communis*, *Sonchus oleraceus*, *S. asper*.

Sterile plants.—Mr. Hosking drew attention to a number of plants (native species or varieties of natives) that appear to be sterile, and gave a list.

Tithonia speciosa × *T. tagetaeflora*.—Mr. P. Lancaster, of Alipur, sent drawings of flowers of plants raised from seed obtained after pollinating the red annual *Tithonia speciosa* with pollen from the perennial *T. tagetaeflora* with yellow flowers. It was not stated whether the seedlings were perennial, but the flowers were of the *T. speciosa* form, generally orange-vermilion, sometimes with a basal yellow zone and yellowish tips to the rays. One had wholly chrome-yellow rays.

Colchicum sp.—A white lilac-tinged *Colchicum* shown by Mr. Baker, of Sevenoaks, was referred to the Committee from the Floral Committee. The two plants appeared somewhat different from one another, and the name is still in some doubt, but they appear to be near *C. Regelii*. They were shown as *C. Szovitsii*.

FRUIT AND VEGETABLE COMMITTEE.

September 6, 1932, Mr. J. CHEAL, V.M.H., in the Chair, and nine other members present.

Exhibits.

R.H.S. Gardens, Wisley : varieties of Marrow from Wisley Trials.

Mr. F. M. Pool, Wood Green : seedling Apple.

John Innes Hort. Inst., Merton : Tomatos from breeding experiments.

The recommendations for awards to Marrows after trial at Wisley were confirmed.

September 20, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

Exhibits.

Mr. T. Cornes, Sandwich : Apple 'Woden Glory.'

Messrs. Laxton, Bedford : Apples 'Laxton's Magnum Bonum,' 'Reward,' 'Rufus,' and Pear 'Harvester.'

September 27, 1932, Mr. C. G. A. NIX, V.M.H., in the Chair, and eight other members present.

Awards Recommended :—

Award of Merit.

To Apple 'Fortune' exhibited by Messrs. Laxton, Bedford. A dessert Apple raised by crossing 'Cox's Orange Pippin' and 'Wealthy.' The fruit is of medium size, rounded-conical and slightly ribbed. The eye is closed in a rather narrow, deep, ribbed basin, and the stalk, which is rather slender and about half an inch long, is inserted in a deep, narrow cavity. The smooth, glossy skin is pale yellowish green, heavily shaded and streaked with rich red and very lightly russeted at the base. The creamy white flesh is firm and the flavour is rich and sweet. A detailed report upon the habit of growth, fertility and other characters will be published in due course, as this variety is growing at Wisley.

Other Exhibits.

Miss L. Style, Hadleigh : Tomato 'Style's Capsicum Shaped.'

Mr. J. Wilson, Trent Park Gardens : Peaches for opinion ('Barrington').

W. van de Weyer, Esq., Dorchester : Grape 'Dedos de Duma' (Lady's Finger).

R.H.S. Commercial Fruit Trials, Wisley : Apples 'Macey,' 'Paradise Pippin,' 'Patricia.'

October 4, 1932, Mr. C. G. A. NIX, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Gold Medal.

To University of Reading : collection of fruit.

To Messrs. Bunyard, Maidstone : collection of fruit.

To Messrs. Dobbie, Edinburgh : Potatos.

To Messrs. Sutton, Reading : Vegetables.

Silver-Gilt Hogg Medal.

To Messrs. Notcutt, Woodbridge : collection of fruit.

To Messrs. Allgrove, Slough : collection of fruit.

To Messrs. Dickson & Robinson, Manchester : for Onions.

Silver Hogg Medal.

To Messrs. Daniels, Norwich : collection of fruit.

To Messrs. Laxton, Bedford : collection of fruit.

To Messrs. Rivers, Sawbridgeworth : collection of fruit.

To The Barnham Nurseries, Barnham : collection of fruit.

To Messrs. Cheal, Crawley : collection of fruit.

To Messrs. Waterer, Sons & Crisp, Twyford : collection of fruit.

Bronze Hogg Medal.

To Messrs. Spooner, Hounslow : collection of fruit.

Other Exhibits.

- Mr. A. Reeves, Old Catton : collection of fruit.
 Mr. A. T. Goodwin, Maidstone : Peaches.
 Mr. J. J. Kettle, Corfe Mullen : Raspberries.
 Messrs. Brinkler, Osborne & Young, Brixton : Potatos.
 R.H.S. Commercial Fruit Trials, Wisley : New varieties of fruit.
 Swanley Horticultural College, Swanley : Fruit.
 Mr. H. Blake, Shenley : seedling Apple.
 Mr. Cornelius Orchard, Bembridge : Apple 'Cornelius Orchard.'
 Miss Paterson, Parkstone : seedling Apple.
 Mrs. Morris, Gravesend : Apple-sport.
 Mr. H. S. Bullock, Stourport : seedling Apple.
 Mr. Webster, Gordon Castle, Fochabers : highly coloured specimens of Apples.

The Awards recommended by the Sub-Committee visiting Wisley to judge the trials of Onions and Parsley were confirmed.

October 11, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and nine other members present.

Exhibits.

- Miss Cannell, Loddon : Apples 'Cox's Orange Pippin' in boxes.
 Mr. G. H. Webb, Southall : seedling Apple.

October 25, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and thirteen other members present.

Awards Recommended :—

Bronze Hogg Medal.

- To Messrs. Waterer, Sons & Crisp, Twyford : for fruit.

Other Exhibits.

- R.H.S. Gardens, Wisley : Onions from the Wisley Trials.
 Mr. A. G. Sampson, Malden : Apple 'Malden Wonder.'
 Mr. H. H. Knight, Yexham : Apples 'Knight's Russet' and 'Knight's Royal.'
 Mr. A. T. Stevens, Worcester : seedling Apple.
 Mr. F. D. Dyer, Tendring : seedling Apple.
 Mr. H. Barnett, Reading : five varieties of Quince.

November 22, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver-Gilt Hogg Medal.

- To Messrs. Cheal, Crawley : collection of Apples.

Silver Hogg Medal.

- To Messrs. Daniels, Norwich : collection of Apples.
 To Messrs. Laxton, Bedford : collection of Apples.

Other Exhibits.

- Messrs. Bunyard, Maidstone : collection of Apples.
 Mr. B. Hewer, St. Briavels : seedling Apple.
 Miss W. J. Bradshaw, Hillsborough, Co. Down : white seedling Grape 'Lady Houston.'
 Mr. W. Selkirk, Haywards Heath : *Carica Papaya* (Papaw).
 Mr. A. Bayley, Burnham, Bucks : Apple 'Lent Rise.'
 Lady Thornycroft, Bembridge : seedling Apple 'Granny.'
 Mr. De la Garde, 2 Lexington Road, W. 1 : 'Bramley's Seedling' Apple.
 Messrs. Dobbie, Edinburgh : 'Chantenay Red Cored' Carrot.

December 13, 1932, Mr. E. A. BUNYARD, F.L.S., in the Chair, and twelve other members present.

Exhibits.

- Messrs. Ridgeon, Sussex Street, Cambridge : perpetual fruiting Strawberry 'Borain.'
 Messrs. Daniels, Norwich : seedling Apple.
 Mrs. E. L. Morton, Peaslake, nr. Guildford : seedling Apple.
 Mr. R. Stanard, Ware Park, Herts : Apple 'Fairie Queen.'
 Mr. G. C. Addy, Mayland, Essex : Apples 'Mayland Orange Pippin,' 'Addy's Seedling,' and an unnamed seedling.
 Messrs. Bunyard, Maidstone : collection of Apples.

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January 10, 1933, Mr. E. A. BUNYARD, F.L.S., in the Chair, and twelve other members present.

Awards Recommended :—

Silver-Gilt Knightian Medal.

To Messrs. Sutton, Reading : collection of Vegetables.

Apple 'Norfolk Royal,' exhibited by Mr. H. Goude, East Dereham, Norfolk, was recommended for trial at Wisley.

Other Exhibits.

Messrs. G. Bunyard, Maidstone : Salad Potatos.

Mrs. Walter Rawnsley, O.B.E. : Persimmon Seedling.

Mr. F. J. Sage, Canterbury : seedling Apples 'Omega,' 'Iron Duke.'

January 24, 1933, Mr. E. A. BUNYARD, F.L.S., in the Chair, and eleven other members present.

Awards Recommended :—

Gold Medal.

To Messrs. Sutton, Reading : Potatos.

Apple 'Mayland Orange Pippin,' exhibited by Mr. G. C. Addy, Mayland, Essex, was recommended for trial at Wisley.

Other Exhibits.

Mr. R. G. Bond, Worplesdon, Surrey : seedling Apple.

Mr. Hall, Hatfield House Gardens : Apple 'Lemon Pippin.'

Mr. J. M. Richards, Gatton Park Gardens, Reigate : Apple for opinion.

Sir Arthur Hill, Kew : collection of Apples.

February 7, 1933, Mr. E. A. BUNYARD, F.L.S., in the Chair, and fourteen other members present.

Exhibits.

Messrs. Bunyard, Maidstone : Apples in season.

Mr. E. W. Pike, Teddington : Apple for opinion.

February 21, 1933, Mr. E. A. BUNYARD, F.L.S., in the Chair, and twenty-two other members present.

Awards Recommended :—

Silver-Gilt Hogg Medal.

To Messrs. Rivers, Sawbridgeworth : collection of Citrus.

Other Exhibits.

The Duchess of Richmond and Gordon, Chichester : *Cyphomandra betacea* (Tree Tomato).

The Viscountess St. Cyres, Lyminster : Chinese Gooseberry—*Actinidia chinensis*—Jam.

Mr. H. Barnett, Tilehurst : Apple 'D'Arcy Spice,' samples from Berkshire and Essex for comparison.

FLORAL COMMITTEE A.

September 6, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended :—*Gold Medal.*

To Messrs. Dobbie, Edinburgh, for Gladioli.

Silver-gilt Banksian Medal.

To Messrs. Bath, Wisbech, for Gladioli.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Mr. E. Ladhams, Elstead, for herbaceous plants and Nymphaeas.

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

To Mr. J. B. Riding, Chingford, for Dahlias.

Silver Banksian Medal.

To Messrs. Barr, London, for Montbretias.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Chaplin, Waltham Cross, for Roses.

To Messrs. Cheal, Crawley, for Dahlias.

To Messrs. Dickson, Newtownards, for Roses.

To Messrs. Dobbie, Edinburgh, for African Marigolds.

To Mr. S. J. Goodliffe, Bishop's Stortford, for Dahlias and herbaceous plants.

To A. Humbert, Esq. (gardener Mr. E. Moody), Romsey, for Lobelias.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. Carter Page, London, for Dahlias.

To Messrs. Prichard, Christchurch, for herbaceous plants.

To Messrs. Prior, Colchester, for Roses.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Bentall, Havering, for Roses.

To Mr. A. Dawkins, Chelsea, for Gladioli.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Gibson & Amos, Cranleigh, for Gladioli.

To Messrs. Hemsley, Crawley, for Dahlias.

To Messrs. Ladhams, Southampton, for herbaceous plants.

To Messrs. Langridge, Westerham, for Dahlias.

To Messrs. Lawrence, Chatham, for Chrysanthemums.

To Mr. E. B. Le Grice, North Walsham, for Roses.

To Messrs. Redgrove & Patrick, Sevenoaks, for herbaceous plants.

To Messrs. Reuthe, Keston, for herbaceous plants.

To Messrs. Wood, Taplow, for Dahlias.

Award of Merit.

To Chrysanthemum 'Yellow Edward Page' for market (votes unanimous), from Messrs. Luxford, Sawbridgeworth. A large pale canary-yellow Decorative variety with broad florets. It is a sport from 'Edward Page.'

To Gladiolus 'Lotus' for exhibition (votes 8 for, 4 against), from Major G. Churcher, Lindfield. A large-flowered cream variety flushed with pale pink towards the margins.

To Lobelia 'Ann' as a tender border plant (votes 10 for), from Mr. E. Moody, Romsey. A light rosy-carmine variety of the *L. cardinalis* type with dark stems.

Selected for trial at Wisley.

Begonia Tuberous-rooted Frilled Single in the following colours: crimson, pink, rose, scarlet, white, yellow; and the variety 'Fascination,' from Messrs. Blackmore & Langdon, Bath.

Begonia Tuberous-rooted Single in the following colours: crimson, orange, pink, rose, salmon, scarlet, white and yellow, from Messrs. Blackmore & Langdon, Bath.

Chrysanthemum 'Sprite,' from Mr. H. Shoesmith, jun., Woking.

Coreopsis lanceolata 'Bedding Queen,' from Mr. E. Ladhams, Elstead.

Other Exhibits.

Messrs. Blom, Cranleigh: Dahlias.

Messrs. Buckwell, St. Mary Cray: Chrysanthemums.

Messrs. Clark, Dover: herbaceous plants.

Messrs. Gibson & Amos, Cranleigh: Gladiolus 'Aflame.'

Misses Hopkins, Coulsdon : herbaceous plants.
 Mr. A. Kench, Weybridge : herbaceous plants.
 Messrs. Parsons, Gravesend : Pelargonium ' Thomas Earle.'
 Messrs. Prichard, Christchurch : Eryngium ' James Ivory.'
 Mr. H. Woolman, Birmingham : Chrysanthemums.

September 20, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Award of Merit.

To Chrysanthemum ' Elite ' for cutting and market, from Mr. H. Shoesmith, jun., Woking. A rich rose-pink Decorative variety of very good form with a light gold flush at the centre and tips.

Selected for trial at Wisley.

Aster ' Mrs. Elliott,'	from Mr. T. Bones, Cheshunt.
Fuchsia ' Delight '	
Fuchsia ' Fun '	
Fuchsia ' Mars '	} from Messrs. Gibson, Leeming Bar.
Fuchsia ' Ursula '	

Other Exhibits.

Messrs. Allwood, Haywards Heath : Carnation ' Robert Allwood ' (to be seen again).

Mr. J. A. Baxter, Sidcup : Chrysanthemum ' Mrs. J. A. Baxter.'

Messrs. Buckwell, St. Mary Cray : Chrysanthemums.

Messrs. Kelway, Langport : Gladioli.

September 27, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and fifteen other members present.

Recommendations :—

Selected for trial at Wisley.

Aster ' Blue Jacket,' from Mr. E. Ballard, Colwall.

Aster ' Miss May Storr,' from Mr. T. Bones, Cheshunt.

Aster ' Palmyra,' from Mr. T. Bones, Cheshunt.

Aster ' Rosemary,' from Messrs. Burkwood & Skipwith, Kingston-on-Thames.

Aster, Dwarf Hybrid, ' Victor,' from Messrs. Barr, London.

Other Exhibits.

Messrs. Allwood, Haywards Heath : Carnations ' Chastity ' and ' Pelargonium ' (to be seen again), ' Sunset Glow.'

Mr. A. C. Prior, Bromley : Helianthus ' Regent.'

Mr. W. Wells, jun., Merstham : Anthemis ' Sancta Johannes ' selected.

October 4, 1932, Mr. W. CUTHBERTSON, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. S. Ogg, Swanley, for Dahlias.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Blackmore & Langdon, Bath, for Begonias.

To Messrs. Cheal, Crawley, for Dahlias and Michaelmas Daisies.

To Mr. E. Ladhams, Elstead, for herbaceous plants.

To Messrs. Carter Page, London, for Dahlias.

To Messrs. Prior, Colchester, for Roses.

To Mr. J. B. Riding, Chingford, for Dahlias.

Banksian Medal.

To Messrs. Barr, London, for Michaelmas Daisies, etc.

To Messrs. F. Cant, Colchester, for Roses.

To Mr. H. Clarke, Taunton, for Dahlias.

To Misses Hopkins, Coulsdon, for hardy plants.

To Mr. A. Miles, Bickley, for herbaceous plants.

To Messrs. Prichard, Christchurch, for herbaceous plants.

To Messrs. Redgrove & Patrick, Sevenoaks, for herbaceous plants.

To Messrs. Waterer, Sons & Crisp, Twyford, for Michaelmas Daisies.

To Messrs. Wood, Taplow, for Michaelmas Daisies.

Award of Merit.

To Chrysanthemum ' Radiant ' for cutting and market (votes unanimous), from Mr. H. Shoesmith, jun., Woking. A velvety crimson Decorative variety of pleasing form with pointed florets.

To *Chrysanthemum* 'Yellow Globe' for cutting and market (votes unanimous), from Mr. C. T. Kipping, Chelmsford. A loosely built yellow incurved variety of good size and flattish shape. The florets are broad and of good substance.

Selected for trial at Wisley.

Aster 'Beechwood Ray,' from Messrs. Wood, Taplow.

Gladiolus 'Commander Koehl,' from The Orpington Nurseries, Orpington.

Other Exhibits.

Messrs. Clark, Dover : herbaceous plants.

Messrs. Hayward, Clacton-on-Sea : Aster 'Highland Comet.'

Messrs. House, Bristol : Scabious and Kniphofias.

Mr. J. J. Kettle, Corfe Mullen : Violets.

Mr. G. Lockwood, Goodmayes : Aster 'Herbert Lockwood.'

October 11, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. S. Ogg, Swanley, for Dahlias.

To Mr. A. G. Vinten, Balcombe, for *Chrysanthemums*.

Silver Flora Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

Silver Banksian Medal.

To Messrs. Barr, London, for Dwarf Asters, Montbretias and Nerines.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Mr. E. Ladhams, Elstead, for herbaceous plants and shrubs.

To Messrs. McGredy, Portadown, for Roses.

To Mr. J. B. Riding, Chingford, for Dahlias, Asters, etc.

Flora Medal.

To Messrs. Eveleens, Aalsmeer, Holland, for Cyclamens.

To Messrs. Low, Enfield, for Carnations.

To Messrs. Prior, Colchester, for Roses.

To Mr. W. Yandell, Maidenhead, for *Chrysanthemums*.

Banksian Medal.

To Messrs. Bentall, Havering, for Roses.

To Messrs. Dobbie, Edinburgh, for Dahlias and Berberis.

To Messrs. House, Bristol, for Scabious and Kniphofias.

Award of Merit.

To *Chrysanthemum* 'Bridgwater Bronze' for cutting and market (votes unanimous), from Mr. J. A. Barrell, Bridgwater. An excellent reddish-bronze decorative variety of very good form.

Other Exhibits.

Messrs. Engelmann, Saffron Walden : Carnation 'Aurora.'

Misses Hopkins, Coulsdon : hardy plants.

Little Munden Nursery, Ware : Aster 'Gaîté.'

Mr. A. Young, Westerham : Aster 'Kingsley.'

October 25, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and sixteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To Mr. A. G. Vinten, Balcombe, for *Chrysanthemums*.

Silver Banksian Medal.

To Messrs. Barr, London, for Asters, Nerines, etc.

Banksian Medal.

To Misses Allen-Brown, Henfield, for Violets.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. B. R. Cant, Colchester, for Roses.

To Messrs. Cheal, Crawley, for Dahlias, Asters, etc.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Hon. Mrs. Charles Lambton (gardener Mr. A. R. Brumby), Mortimer, for Cyclamen.

To Messrs. Luxford, Sawbridgeworth, for *Chrysanthemums*.

To Messrs. Redgrove & Patrick, Sevenoaks, for Dahlias and Asters.

To Mr. W. Yandell, Maidenhead, for Dahlias and *Chrysanthemums*.

Award of Merit.

To *Chrysanthemum* 'Bernea' for show purposes (votes unanimous), from Messrs. Luxford, Sawbridgeworth. A large Japanese incurved variety with broad florets, having the outer surface silvery-pink and the inner surface deep rose.

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To *Chrysanthemum* 'Bridgwater Gold' for cutting and market (votes unanimous), from Mr. J. A. Barrell, Bridgwater. A bright golden-yellow Decorative variety of good form. The flowers are borne on long stiff stems.

To *Chrysanthemum* 'Maribelle May' for cutting and market (votes unanimous), from Mr. D. Morrison, Glasgow. A golden-yellow Incurred variety of excellent form with broad florets. It is a sport from the variety 'Le Pactole.'

To *Chrysanthemum* 'Myrobella' for cutting and market (votes unanimous), from Mr. H. Shoesmith, jun., Woking. A Decorative variety with stiff broad rich bright red florets having a golden reverse.

To *Chrysanthemum* 'Pink Topaz' for cutting and market (votes unanimous), from Mr. H. Shoesmith, jun., Woking. A very neat silvery-pink Incurred variety of excellent form.

Selected for trial at Wisley.

Aster 'Mrs. A. W. Booth,' from Messrs. C. Elliott, Stevenage.

The following awards were made after trial at Wisley :

Award of Merit.

To *Aster Amellus* 'Violet,' sent by Mr. T. Bones, Cheshunt. Height 22 inches; flowers violet, 2 inches diameter; disc golden. Raised by sender.

To *Aster novae-angliae* 'Shakespeare,' sent by Messrs. Pabst, Erfurt, Germany. Plant 4 feet; flowers deep rose, $1\frac{1}{2}$ inch diameter; disc yellow. Raised by sender.

To *Aster novi-belgii* 'Blue Eyes,' sent by Messrs. E. Ballard, Colwall. Height 3 feet; flowers lavender-blue, $1\frac{1}{2}$ inch diameter; disc yellow. Raised by sender.

To *Aster novi-belgii* 'My Choice' sent by Mr. E. Beckett, Elstree. Height 4 feet; flowers rose-pink, $1\frac{1}{2}$ to $1\frac{3}{4}$ inch diameter; disc yellow. Raised by sender.

To *Aster novi-belgii* 'Joker,' sent by Mr. E. Beckett, Elstree. Habit of 'My Choice' but flowers rose. Raised by sender.

To *Aster novi-belgii* 'Redstart,' sent by Mr. E. Beckett, Elstree. Habit of 'My Choice' but flowers deep rich rose. Raised by sender.

To *Aster novi-belgii* 'Aldenham Glory,' sent by Mr. E. Beckett, Elstree. Height $3\frac{1}{2}$ feet; flowers lavender-lilac, $1\frac{1}{2}$ to $1\frac{3}{4}$ inch diameter; disc yellow. Raised by sender.

To *Aster novi-belgii* 'Rosebud,' sent by Mr. E. Beckett, Elstree. Height $5\frac{1}{2}$ feet; flowers $1\frac{1}{2}$ inch diameter, bright rose; disc yellow; late flowering. Raised by sender.

To *Aster novi-belgii* 'Pink Nymph,' sent by Messrs. W. Wood, Taplow. Height $5\frac{1}{2}$ feet; of 'Climax' habit; flowers rose-pink, 1 to $1\frac{1}{4}$ inch diameter; disc yellow. Raised by Mr. E. Beckett and introduced by sender.

Highly Commended.

To *Aster novi-belgii* 'Ring o' Roses,' sent by Mr. E. Beckett, Elstree. Height 3 feet; flowers bright rich rose; disc yellow. Raised by sender.

To *Aster novi-belgii* 'Northern Gem,' sent by Messrs. Dickson & Robinson, Manchester. Described R.H.S. Journal, vol. 51, p. 105.

To *Aster novi-belgii* 'Lady Hunsdon,' sent by Mr. E. Beckett, Elstree. Height 4 feet; flowers deep rose, $1\frac{1}{2}$ to $1\frac{3}{4}$ inch diameter; disc yellow. Raised by sender.

To *Aster dumosus* \times *novi-belgii* 'Victor,' sent by Messrs. Barr, Covent Garden, W.C. 2. Height 1 foot, of tufted habit; flowers pale lavender, single, $1\frac{1}{2}$ inch diameter; disc yellow. Raised by Mr. H. Victor Vokes.

To *Aster dumosus* \times *novi-belgii* 'Nancy,' sent by Messrs. Barr. Height 9 inches, of tufted habit; flowers very pale pinkish-lavender, single, $1\frac{1}{2}$ inch diameter; disc yellow. Raised by Mr. H. Victor Vokes.

To *Aster dumosus* \times *novi-belgii* 'Marjorie,' sent by Messrs. Barr. Height 9 inches, of tufted habit; flowers single, bright rose-pink, $1\frac{1}{2}$ inch diameter; disc yellow. Raised by Mr. H. Victor Vokes.

Other Exhibits.

Hon. Mrs. W. Borthwick, Brancaster : Aster 'Margaret.'

Mr. I. Godber, Willington : Chrysanthemum 'Mrs. I. Godber.'

Mr. J. J. Kettle, Corfe Mullen : Violets.

Mr. T. Parry, Droitwich : Aster 'Amy Johnson.'

Messrs. Tyson, Crawley : Chrysanthemum 'Avondale Rose.'

Mr. H. Woolman, Birmingham : Chrysanthemum 'Alex. Jackson.'

November 22, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—

Silver-gilt Banksian Medal.

To the Rt. Hon. The Lady Lilford (gardener Mr. G. F. Hallett), Peterborough, for Begonias.

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Blackmore & Langdon, Bath, for Cyclamens.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Jones, Lewisham, for Chrysanthemums.

To Messrs. Peed, West Norwood, for Begonias.

To Sir Samuel Roberts, M.P. (gardener Mr. O. Rawlinson), Swaffham, for Begonias.

To Messrs. Sutton, Reading, for Cascade Chrysanthemums.

To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

To Mr. H. Woolman, Birmingham, for Chrysanthemums.

Banksian Medal.

To Franklands Nurseries, Pangbourne, for Cyclamens.

To Mr. J. J. Kettle, Corfe Mullen, for Violets.

To Messrs. Low, Enfield, for Carnations.

To Mrs. V. M. Peech (gardener Mr. Snell), Wimbledon, for specimen Chrysanthemums in pots.

Award of Merit.

To Chrysanthemum 'Avondale Beauty' for cutting and market (votes 12 for, 4 against), from Mr. T. Tyson, Crawley. A medium-sized pale silvery-pink Incurved variety, lightly tipped with green.

To Chrysanthemum 'Dorothy' for exhibition and market (votes unanimous), from Mr. H. Shoesmith, jun., Woking. A very large bright rose-pink Single variety with several rows of broad florets which have a silvery reverse.

To Chrysanthemum 'H. E. Trueman' for exhibition (votes unanimous), from Mr. H. Woolman, Birmingham. A very large pure white Japanese variety with broad florets.

To Chrysanthemum 'May Parker' for cutting and market (votes unanimous), from Messrs. W. H. Parker, Worthing. A large deep yellow Incurved variety with broad florets.

To Chrysanthemum 'Shirley Glory' for cutting and market (votes unanimous), from Mr. H. Woolman, Birmingham. A bright orange-bronze Decorative variety of nice form and having a pale greenish-yellow reverse.

The following Award was made after trial at Wisley :

Award of Merit.

To Cascade Chrysanthemums sent by Messrs. Sutton, Reading. A good strain of single-flowered forms, comprising shades of bronze, yellow, pink and white.

Other Exhibits.

Mr. O. R. Clark, Hampstead : Chrysanthemum seedling.

Mr. A. Feaviour, Wimbledon Park : Chrysanthemums.

Mr. D. Foxwell, Balcombe : Chrysanthemum 'Alan Foxwell.'

Lady Loch (gardener Mr. W. Blyth), Stoke-by-Clare : Cascade Chrysanthemums.

Mr. J. E. Powell, Hinckley : Chrysanthemum 'Hinckley Yellow.'

Mr. J. Shoebridge, London : Chrysanthemums.

Studley College, Warwickshire : Chrysanthemum 'Firelight.'

Swanley Horticultural College, Swanley : Chrysanthemums.

Mr. D. B. Wilkinson, Chertsey : Chrysanthemum seedlings.

The Women's Farm and Garden Association, London : Violets and Chrysanthemums.

December 13, 1932, Mr. W. CUTHBERTSON, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—*Silver-gilt Banksian Medal.*

To Messrs. Luxford, Sawbridgeworth, for Chrysanthemums.

Silver Banksian Medal.

To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

To Mr. H. Woolman, Birmingham, for Chrysanthemums.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Engelmann, Saffron Walden, for Carnations.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

First-class Certificate.

To Chrysanthemum 'American Beauty' for cutting, market and show purposes (votes unanimous), from Mr. T. Stevenson, Hillingdon. This excellent, pure white Incurved variety for Christmas and late flowering received an Award of Merit on January 12, 1932. It is of American origin.

Award of Merit.

To Begonia Gloire de Lorraine 'Bath Belle' as a greenhouse pot plant (votes unanimous), from Messrs. Blackmore & Langdon, Bath. A sport from Begonia 'Rothschild's Pink,' having a great abundance of much larger bright rose-pink flowers and an improved habit. The flowers measure $1\frac{1}{2}$ inch across.

To Chrysanthemum 'King George V' for cutting and market (votes unanimous), from Mr. H. Woolman, Birmingham. A large Decorative variety with deep rich crimson curled florets.

To Chrysanthemum 'Miss England' for cutting and market (votes unanimous), from Mr. H. Woolman, Birmingham. A flattish Incurved variety with broad silvery-pink florets.

Other Exhibits.

Mr. G. Carpenter, Byfleet: Carnation 'Melody' and Chrysanthemum 'December Yellow.'

Messrs. Greenyer, Worthing: Chrysanthemum 'Valli.'

Mr. J. J. Kettle, Corfe Mullen: Violets.

Messrs. Luxford, Sawbridgeworth: Chrysanthemum 'Bronze Phyllis Cooper.'

Mr. W. E. Merrett, Weybridge: Chrysanthemum 'Ham Court Pink.'

Mrs. Courtney Page, Haywards Heath: Roses.

Mrs. E. Robson, Hull: Chrysanthemum 'Mrs. E. Robson.'

Mr. H. Shoesmith, jun., Woking: Chrysanthemums.

Messrs. Toogood, Southampton: Primulas.

Messrs. Tyson, Crawley: Chrysanthemum 'Mrs. T. Tyson.'

Waterperry House School of Horticulture, Oxford: Chrysanthemums.

January 10, 1933, Mr. G. W. LEAK, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended:—

Silver Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations, Lachenalias, Euphorbias and Pansies.

Banksian Medal.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Toogood, Southampton, for Cyclamens.

To Mr. A. G. Vinten, Balcombe, for Chrysanthemums.

Other Exhibits.

Messrs. Allwood, Haywards Heath: Carnations.

Misses Hopkins, Coulsdon: hardy plants.

Mr. J. J. Kettle, Corfe Mullen: Violets.

January 24, 1933, Mr. G. W. LEAK, V.M.H., in the Chair, and thirteen other members present.

Awards Recommended:—

Gold Medal.

To Messrs. Blackmore & Langdon, Bath, for Cyclamens.

Silver Banksian Medal.

To Messrs. Engelmann, Saffron Walden, for Carnations, Euphorbias, Lachenalis and Pansies.

To Messrs. Wakeley, London, for Hyacinths.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Toogood, Southampton, for Primulas.

Other Exhibits.

Misses Hopkins, Coulsdon: hardy flowers.

Mrs. O. R. McMullen, Ware: *Primula malacoides*, double form.

Mrs. C. T. Milburn, King's Somborne: Carnation 'Nancy Moss.'

Messrs. W. H. Simpson, Birmingham: *Primula malacoides* 'True Rose.'

Uggeshall Rectory Gardens, Beccles: *Primula* 'Helio,' Hyacinths, etc.

February 7, 1933, Mr. G. W. LEAK, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended:—

Gold Medal.

To Messrs. Sutton, Reading, for Cyclamens.

Silver Banksian Medal.

To Messrs. Carter, Raynes Park, for *Primula malacoides* in variety.

To Messrs. Engelmann, Saffron Walden, for Carnations, Euphorbias, Pansies, etc.

Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

To Messrs. Toogood, Southampton, for Primulas.

To Messrs. Wakeley, London, for flowering bulbs.

Award of Merit.

To Carnation 'Robert Allwood' for cutting and market (votes unanimous), from Messrs. Allwood, Haywards Heath. A scarlet perpetual-flowering variety of excellent form and having very full flowers with good calyces.

Selected for trial at Wisley.

Primula sinensis fimbriata 'Dazzler,' from Messrs. Hurst, Houndsditch.

Other Exhibits.

Misses Hopkins, Coulsdon : hardy flowers.

The Hon. Robert James, Richmond, Yorkshire : *Clivia* 'Fay.'

February 21, 1933, Mr. G. W. LEAK, V.M.H., in the Chair, and nineteen other members present.

Awards Recommended :—**Silver-gilt Banksian Medal.**

To Messrs. Bath, Wisbech, for flowering bulbs in fibre.

To Messrs. Sutton, Reading, for Cinerarias.

Silver Banksian Medal.

To Messrs. Allwood, Haywards Heath, for Carnations.

To Messrs. Carter, Raynes Park, for Crocuses and *Primula malacoides*.

To Mr. G. H. Dalrymple, Bartley, for Freesias.

To Mr. A. Dawkins, Chelsea, for *Primula malacoides* 'Dawkins' Carmine Pink.'

To Messrs. Engelmann, Saffron Walden, for Carnations, Euphorbias, Pansies, etc.

To Messrs. Wakeley, London, for Daffodils, Tulips and Crocuses.

Banksian Medal.

To Messrs. Dobbie, Edinburgh, for Crocuses.

To Lady Hadden (gardener Mr. O. Hayles), Berkhamstead, for *Primula* 'Rossway Beauty.'

To Messrs. Low, Enfield, for Carnations and other greenhouse plants.

Award of Merit.

To Crocus 'Snowstorm' for bedding (votes unanimous), from Messrs. Wakeley, London. A large white variety of Dutch origin with very faint purple streaks inside the inner segments and a very slight feathering of the same colour at the base of the flower.

To Freesia 'Her Grace' for cutting, market and cultivation in pots (votes unanimous), from Mr. G. H. Dalrymple, Bartley. Height 24-30 inches; 8 flowers to the spike, 3 out at a time; flowers large, light lavender-violet, throat white. A seedling from 'Maryon.'

To Freesia 'Melody' for cutting, market and cultivation in pots (votes unanimous), from Mr. G. H. Dalrymple, Bartley. Height 24-30 inches; 6 flowers to the spike, 3-4 out at a time; flowers large, open, pale yellow with orange lip; very fragrant. A seedling from 'Golden Eagle.'

Selected for trial at Wisley.

Primula malacoides 'Dawkins' Carmine Pink,' from Mr. A. Dawkins, Chelsea.

Other Exhibits.

Mrs. C. Disraeli, O.B.E. (gardener Mr. W. A. Bright), High Wycombe : Violets.

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FLORAL COMMITTEE B.

September 6, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fourteen other members present.

Awards Recommended :—**Silver Banksian Medal.**

To Messrs. Russell, Richmond, for Nymphaeas, Clematis and shrubs.

To Messrs. Neale, Newhaven, for succulents.

Preliminary Commendation.

To *Iberis linifolia* as a tender flowering plant (votes 8 for, 1 against), from Mrs. E. Torkington, Maidenhead. A semi-shrubby species from Spain and

Southern France. It is a bushy plant a foot or so in height, with small, narrow leaves and terminal corymbs of small lilac flowers.

Cultural Commendation.

To Mr. C. P. Raffill, Assistant Curator, Royal Botanic Gardens, Kew, for very fine cut specimens of *Lilium Brownii* var. *colchesterei*. The flowers exhibited were from plants raised from seed at Kew. This Lily received the Society's F.C.C. in 1895, when shown by Messrs. Wallace as *L. japonicum* var. *colchesterei*.

Other Exhibits.

Messrs. Gibson & Amos, Cranleigh : *Gladiolus carmineus*.

F. J. Hanbury, Esq., East Grinstead : *Nepeta nervosa*.

Messrs. Rogers, Southampton : Heaths and dwarf conifers.

Viscountess St. Cyres, Lymington : *Dianella tasmanica*.

September 20, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty other members present.

Awards Recommended :—

Award of Merit.

To *Habranthus advenum* as a tender flowering plant (votes 18 for), from Sir Wm. Lawrence, Bt., Burford. A small bulbous plant suitable for the cool house. The narrow, funnel-shaped flowers are borne two or three together on slender scapes rising from the bulb before the leaves are fully developed. The perianth is of a rich, dark red colour.

To *Francoa sonchifolia* as a hardy flowering plant (votes 14 for), from Reginald Cory, Esq., Duffryn. A Chilean herbaceous plant forming a basal rosette of soft green, lyrate leaves. The flowers are produced in slender, terminal racemes on long, branched, hairy stems. They are rose-coloured, with darker spots.

Preliminary Commendation.

To *Amaryllis Belladonna* × *Nerine Bowdenii* as a hardy flowering plant (votes unanimous), from W. H. B. Fletcher, Esq., Bognor. A hybrid which has the appearance of a vigorous Nerine with rather narrow, twisted petals. The stamens are somewhat curved as in the first-named parent.

Cultural Commendation.

To Mr. Pateman, gardener to Major Albert Pam, Wormley, Bury, Herts, for an inflorescence of *Amarcrinum* × *Howardii*. This is the hybrid raised by Mr. F. Howard, of Los Angeles, from the cross *Amaryllis Belladonna* ♀ × *Crinum Moorei* ♂. It received the Society's F.C.C. on September 21, 1926, and is described in the JOURNAL, vol. 52, p. cii (*Crinum Powellii* is wrongly mentioned there as a parent of the hybrid). The present plant is figured at t. 9162 of the Botanical Magazine as *Crinodonna* × *Corsii*, a name which the Editor of the last-named publication uses also for another hybrid raised by Dr. Ragioneri of Castello, near Florence. As grown at Kew, the American and Italian plants are dissimilar.

To Mr. Payne, gardener to Dr. P. L. Giuseppi, Felixstowe, for an exhibit of *Dianthus fruticosus*.

Other Exhibits.

Mark Fenwick, Esq., Stow-on-the-Wold : *Kirengeshoma palmata*.

Collingwood Ingram, Esq., Benenden : *Paeonia obovata alba*. This very beautiful Chinese Paeony received the Award of Merit as a flowering plant seven years ago. In fruit, as exhibited by Mr. Ingram, it is very handsome. While the foliage is yet green, the ripe follicles, in groups of three or four, open and reflex, exposing the large seeds. Of these, the fertile ones are round and slate-blue, the sterile laterally compressed, vermilion.

Lt.-Col. L. C. R. Messel, Handcross : *Lilium Wallichianum*.

Mrs. H. Milford, Chedworth : *Lupinus Torreya*.

H. H. Mitchell, Esq., Putney : *Ipomoea daphnensis*.

Mr. Amos Perry, Enfield : *Nuphar japonica rubra*, *Nerine filifolia*.

September 27, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Award of Merit.

To *Viburnum Opulus* var. *xanthocarpum* as a hardy, ornamental, fruited shrub (votes 14 for), from Sir Wm. Lawrence, Bt., Burford. A variety of the common Guelder Rose with fruits of soft yellow, shaded with orange.

Preliminary Commendation.

To *Scabiosa Fischeri* (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. A pretty species from Dahuria, with finely dissected foliage and medium-sized violet flowers.

Other Exhibits.

Mr. W. Butt, Chalford : *Buddleia Forrestii*.

Sir Wm. Lawrence, Bt., Burford : *Fuchsia cotinghamensis*, *Cotoneaster acutifolia villosula*.

Messrs. Russell, Richmond : *Mussaenda erythrophylla*. A small West African shrub with large, opposite, ovate leaves and terminal inflorescences of tubular, creamy pink flowers. In one flower of each partial cyme the anterior calyx-lobe resembles a foliage leaf in size and shape and assumes a vivid rosy crimson colour.

Messrs. Wallace, Tunbridge Wells : *Erica cinerea* 'Golden Hue.'

October 4, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and nine other members present.

Exhibits.

Hocker Edge Gardens, Cranbrook : *Sternbergias* and *Colchicums*.

Sir Wm. Lawrence, Bt., Burford : *Eriogonum nudum* var. *sulphureum*.

Miss M. C. Müller, Camberley : *Colchicum speciosum album*.

October 11, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver-gilt Flora Medal.

To Messrs. Russell, Richmond, for *Clematis* and stove plants.

Silver-gilt Banksian Medal.

To Messrs. Cheal, Crawley, for shrubs.

Silver Flora Medal.

To the Marquess of Headfort, Kells, for shrubs.

To Messrs. Neale, Newhaven, for succulents.

Silver Banksian Medal.

To Mr. T. M. Endean, Laindon, for Cacti and Mesembryanthemums.

To Mr. J. Hogger, Felbridge, for conifers.

To Messrs. Hillier, Winchester, for shrubs.

Flora Medal.

To Mr. H. Hemsley, Crawley, for shrubs.

Banksian Medal.

To Lady B. Stanley, Market Harborough, for shrubs.

Award of Merit.

To *Cimicifuga simplex*, Elstead Variety, as a hardy flowering plant (votes 14 for), from Mr. E. Ladhams, Godalming. A graceful herbaceous plant four or five feet high, with handsome finely-cut leaves and slender, purple-tinted racemes of small, creamy-white flowers.

To *Cotoneaster frigida fructu-luteo* as a hardy, ornamental-fruiting tree (votes 12 for, 5 against), from the Marquess of Headfort, Kells. This variety, with pale yellow fruits, is less common than the type which is universally appreciated for its abundant clusters of rich crimson berries.

To *Cyananthus longiflorus* as a hardy flowering plant for rock garden or alpine house (votes 12 for, 1 against), from the Marquess of Headfort. A most desirable species discovered by Forrest in Yunnan. The prostrate growths are set with clusters of small, fleshy, bright green leaves. The shortly-stalked, erect flowers are developed in succession. The calyx is fleshy and five-lobed ; the corolla tubular with five lanceolate, spreading segments, violet passing to white at the base.

To *Photinia villosa* as a hardy ornamental-fruiting shrub (votes 12 for, 2 against), from the Marquess of Headfort, Kells. A deciduous shrub or small tree, with shortly-stalked, finely-toothed leaves of varying shape, turning red or yellow in autumn. The white flowers are borne in small panicles and are succeeded by ellipsoid red berries.

Preliminary Commendation.

To *Cryptanthus acaulis* var. *picturatus* as an ornamental-foliaged stove plant (votes unanimous), from Messrs. L. R. Russell, Richmond. A tropical Bromeliad of remarkable colouring. The spreading lanceolate leaves are undulate, the upper surface patterned with silver and shades of brown, the lower of a dull, silvery hue.

Other Exhibits.

Messrs. Burkwood & Skipwith, Kingston-on-Thames : shrubs.

Messrs. Clark, Dover : shrubs.

A. J. Cobb, Esq., Reading : strains of *Rosa canina*, *R. Froebelli*, *R. rubiginosa*.

CX PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

The Marquess of Headfort, Kells : *Enkianthus Palibinii*, *Acer dasycarpum*, *Rosa holodonta*, *Quercus rubra*, *Berberis* sp.

Knap Hill Nurseries, Woking : shrubs.

Messrs. Lock, Yeovil : conifers.

Mrs. J. W. Metcalfe, Westcott : *Senecio* sp.

Miss E. Willmott, Great Warley : *Elsholtzia Stauntonii*.

October 25, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Neale, Newhaven, for succulents.

To Messrs. Waterer, Bagshot, for shrubs.

Banksian Medal.

To Messrs. J. Cheal, Crawley, for shrubs.

To Mr. E. Ladhams, Elstead, for shrubs and hardy plants.

To Messrs. Russell, Richmond, for shrubs.

Award of Merit.

To *Campanula argyrotricha* as a flowering plant for rock garden and alpine house (votes unanimous), from T. Hay, Esq., Hyde Park. A very pretty species from high altitudes in Kashmir. It is a dwarf plant with spreading stems clothed with small, ovate-lanceolate, toothed leaves of pale, silvery green. The solitary lavender flowers are borne on ascending leafy stalks for a long period.

To *Fuchsia magellanica alba* as a hardy flowering shrub (votes 12 for, 2 against), from Sir Wm. Lawrence, Bt., Burford. A Chilean shrub suitable for planting in sheltered spots in the open. It makes a compact plant with small leaves and pendent creamy-white and purple flowers.

To *Rhus Potaninii* as a hardy ornamental-foliaged shrub (votes 12 for), from Messrs. J. Cheal, Crawley. A Chinese shrub or small tree valuable for the rich red autumnal colour of its foliage. The pinnate leaves have seven to nine ovate-oblong, entire leaflets.

Preliminary Commendation.

To *Aponogeton angustifolium* as a hardy aquatic flowering plant (votes unanimous), from Mr. Amos Perry, Enfield. An uncommon Cape Pond Weed. The lanceolate leaves are two inches long ; the white, waxy flowers, which are sweetly scented, are borne in forked inflorescences similar in form to those of the larger *Aponogeton distachyon*.

To *Satureia montana* var. *illyrica* as a hardy flowering plant for the rock garden (votes 14 for), from Sir Wm. Lawrence, Bt., Burford. A variety of the herb called Winter Savory. It is a pleasantly aromatic subshrub, with small, oblong, glandular leaves and terminal panicles of small, tubular, lavender flowers.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks : *Sternbergia macrantha*.

Central Garden Supplies, Kenton : dwarf conifers.

Messrs. Cheal, Crawley : *Ligustrum Delavayanum*.

T. Hay, Esq., Hyde Park : *Coleus barbatus*.

Misses Hopkins, Coulsdon : rock plants.

Lye Green Nurseries, Chesham : aromatic plants.

F. C. Stern, Esq., Goring-by-Sea : *Euonymus europaeus roseus pallidus*.

November 22, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Silver Lindley Medal.

To Mr. T. M. Endean, Laindon, for Mesembryanthemums.

Banksian Medal.

To Messrs. Neale, Newhaven, for succulents.

To Mr. Amos Perry, Enfield, for hardy ferns.

To Messrs. Russell, Richmond, for stove plants.

To Messrs. Stewart, Ferndown, for shrubs.

To Messrs. T. Yano, London, W., for dwarf conifers.

Award of Merit.

To *Conophytum minutum* as a flowering plant for the cool house (votes 13 for), from Mr. T. M. Endean, Laindon. A low-growing, stemless succulent. Each tiny growth is composed of a pair of fleshy leaves united to form a little grey-green ball, from the centre of which springs a small, many-petalled, rose-coloured flower.

To *Elaeagnus macrophylla* as an ornamental-foliaged and flowering shrub (votes 15 for, 1 against), from Mr. R. C. Notcutt, Woodbridge. A very handsome, evergreen, Japanese shrub. The leaves are about four inches long, broadly ovate, dark green above and covered beneath, as are the stems, with innumerable glistening silvery scales. The small, creamy-white flowers appear in late autumn, are fragrant, and are followed by ellipsoid red fruits.

Other Exhibits.

Central Garden Supplies, Kenton : dwarf conifers.
Cobham Hall Estate Co. : *Plectranthus Ecklonii*.
Messrs. Clark, Dover : shrubs.
Mr. T. M. Endean, Laindon : *Glottiphyllum Marlothii*.
Hocker Edge Gardens, Cranbrook : alpine plants.
Mrs. Lloyd Edwards, Wrexham : *Gladiolus Mackinderi*.
Countess Grey, Alnwick : *Buddleia auriculata*, *Olearia Solanderi*.
Lady Loch, Stoke-by-Clare : *Pyrethrum japonicum*.
Mrs. R. S. Milford, Chedworth : alpine plants.
Mr. R. C. Notcutt, Woodbridge : *Osmanthus ilicifolius*.
Mr. Amos Perry, Enfield : *Cyperus Haspan viviparus*.
E. M. Preston, Esq., Hayes : *Correa Backhousiana*.
Messrs. Stewart, Ferndown : *Symphoricarpus orbiculatus*.

December 13, 1932, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-two other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Russell, Richmond, for stove and greenhouse plants.

Banksian Medal.

To Mr. T. M. Endean, Laindon, for Cacti and Crassulas.

To Messrs. Neale, Newhaven, for succulents.

To Mr. Amos Perry, Enfield, for hardy ferns and Schizostylis.

To Messrs. T. Yano, London, W., for dwarf conifers.

Award of Merit.

To *Holmskioldia sanguinea* as a tender flowering shrub (votes 12 for, 5 against), from Reginald Cory, Esq., Duffryn. An uncommon Himalayan climber of the Natural Order Verbenaceae. The slender, angled branches bear opposite, ovate-acuminate, toothed leaves of soft texture. The tubular, scarlet flowers are carried in few-flowered axillary cymes, and are remarkable for the enlarged, saucer-shaped red calyx.

To *Jasminum Rex* as a flowering shrub for the warm greenhouse (votes 15 for), from the Director, Royal Botanic Gardens, Kew. A very beautiful species from Siam. It is a shrub with simple, entire, dark green leaves four inches or more in length and one-half as wide. The pure white flowers, which are among the largest in the genus, are composed of eight or nine petals and may be over two inches in diameter. They are produced in cymes of three, forming short panicles at the tips of the branchlets.

To *Raphiolepis* × *Delacouri* as a hardy flowering shrub (votes unanimous), from Viscountess St. Cyres, Lymington. This is a handsome evergreen shrub suitable for sheltered places. The dark green toothed leaves are lustrous and leathery. The small, five-petalled, pink flowers are produced in panicles at the tips of the young growths. *R.* × *Delacouri*, which is a hybrid between two Eastern Asiatic species, is well figured in the Revue Horticole, 1900, p. 698.

Other Exhibits.

Messrs. Clark, Dover : shrubs.

Mr. T. M. Endean, Laindon : *Crassula lactea*.

Lye Green Nurseries, Chesham : aromatic foliage plants.

Mr. R. C. Notcutt, Woodbridge : *Cotoneaster rotundifolia*, *Berberis* 'Barbarossa.'

Messrs. Russell, Richmond : *Medinella javanensis*.

January 10, 1933, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and fifteen other members present.

Awards Recommended :—

Banksian Medal.

To Messrs. Barr, Taplow, for Hellebores and bulbous plants.

To Messrs. Neale, Newhaven, for succulents.

To Messrs. Russell, Richmond, for Hamamelis, Hellebores and stove plants.

To Walton Park Nurseries, Walton-on-Thames, for Hamamelis, Heaths and conifers.

Award of Merit.

To *Coleus Frederici* as a flowering plant for the greenhouse (votes 11 for, 2 against), from the Director, Royal Botanic Gardens, Kew. A species of somewhat lax, spreading habit, reaching a height of two feet. The opposite leaves are dark green, cordate and coarsely toothed. The deep blue flowers are borne in slender, branched panicles.

To *Dudleya pulverulenta* as an ornamental-foliage plant for the cool greenhouse (votes 14 for), from Messrs. C. Elliott, Stevenage. A very handsome rosette plant, sometimes known as *Echeveria pulverulenta* or *Cotyledon pulverulenta*. The specimen exhibited was nearly a foot in diameter, and bore a large number of spatulate, acute and undulate leaves. The peculiar attraction of the plant lies in the heavy layer of silvery meal which completely covers its foliage. The small, red flowers are produced in a forked inflorescence which rises from the base of the leaf-cluster.

To *Rhododendron pemakoense* as a hardy flowering shrub for the rock garden (votes unanimous), from Sir John F. Ramsden, Bt., Gerrard's Cross. The award was recommended for this plant, subject to naming, when it was shown on April 24, 1928, under the number K.W.6301, and is now confirmed. *R. pemakoense* forms a dwarf bush only a few inches high, clothed with spatulate leaves $\frac{1}{4}$ inch long, dark green above, greyish below. The flowers are usually solitary, widely expanded, white with a suffusion of mauve externally. The flower-buds are liable to suffer damage from frost.

Other Exhibits.

Messrs. Hemsley, Crawley : shrubs.

Hocker Edge Gardens, Cranbrook : alpine plants.

Collingwood Ingram, Esq., Benenden : *Prunus serrulata* 'Fudan-zakura.'

Sir Wm. Lawrence, Bt., Burford : *Polypodium Scouleri*.

Messrs. G. Reuthe, Keston : shrubs and alpine plants.

The Marquess of Salisbury, Hatfield : *Chimonanthus fragrans grandiflorus*. This early-flowering, pale-coloured variety received the A.M. in 1928. The branches exhibited on the present occasion were heavily laden with fragrant flowers, and were cut from a plant believed to have been planted at Hatfield a century ago.

January 24, 1933, Mr. E. A. BOWLES, M.A., F.L.S., V.M.H., in the Chair, and fifteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Stewart, Ferndown, for shrubs and bulbous plants.

Banksian Medal.

To Messrs. Barr, Taplow, for Hellebores and bulbous plants.

To Messrs. Cheal, Crawley, for shrubs.

To Messrs. Hemsley, Crawley, for shrubs.

To Hocker Edge Gardens, Cranbrook, for hardy Heaths.

To the Rev. Rollo Meyer, Hertford, for Irises.

To Messrs. Russell, Richmond, for shrubs and stove plants.

Other Exhibits.

Messrs. Clark, Dover : shrubs.

Hocker Edge Gardens, Cranbrook : *Iris Danfordiae*.

Knap Hill Nurseries, Woking : shrubs.

Lady Martineau, Ascot : *Kalanchoe tubiflora*.

Messrs. Redgrove & Patrick, Sevenoaks : shrubs.

Messrs. Reuthe, Keston : shrubs.

Lionel de Rothschild, Esq., Exbury : *Gordonia axillaris*.

The Marquess of Salisbury, Hatfield : *Chimonanthus fragrans*.

Messrs. Waterer, Bagshot : shrubs and bulbous plants.

February 7, 1933, Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and seventeen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Russell, Richmond, for flowering shrubs.

To Messrs. Stewart, Ferndown, for shrubs and bulbous plants.

Banksian Medal.

To Messrs. Barr, Taplow, for Hellebores and bulbous plants.

To Messrs. Cheal, Crawley, for shrubs and bulbous plants.

To Mr. T. M. Endean, Laindon, for succulents.

To Messrs. Hemsley, Crawley, for evergreen shrubs.

To Hocker Edge Gardens, Cranbrook, for *Crocus* species and other bulbous plants.

To Messrs. Neale, Newhaven, for Mesembryanthemums and Cacti.

To Messrs. Reuthe, Keston, for shrubs.

To Walton Park Nurseries, Walton, for flowering shrubs.

To Messrs. Waterer, Bagshot, for Hollies.

To Messrs. Waterer, Twyford, for shrubs and bulbous plants.

To Mr. G. E. Welch, Cambridge, for alpine plants.

First-Class Certificate.

To *Pamianthe peruviana* as a flowering plant for the greenhouse (votes unanimous), from Sir Wm. Lawrence, Bt., Burford. A beautiful Amaryllid, introduced from Peru by Major Albert Pam. In 1930, on the occasion of its first flowering, it received the Botanical Certificate. The plant forms a narrow, long-necked bulb which produces several very long, drooping, strap-shaped leaves and an erect scape eighteen inches high, bearing five or six flowers. The flower is nine inches long, narrowly tubular, with six spreading, linear, white segments and a broad corona carrying the stamens. The flowers are sweetly scented and last well in water.

Other Exhibits.

Messrs. Clark, Dover : shrubs.

Messrs. C. Elliott, Stevenage : *Juniperus Coxii*.

Dame Alice Godman, D.B.E., Horsham : *Babiana flabellifolia*.

Messrs. Hughes, Sutton Green : shrubs.

Sir Wm. Lawrence, Bt., Burford : *Hippeastrum equestre splendens*, *Griffinia blumenavia*.

Lady Leconfield, Petworth : *Crocus cypricus*.

The Hon. H. D. McLaren, Bodnant : *Banksia collina*.

Lt.-Col. L. C. R. Messel, O.B.E., Handcross : *Hartia sinensis*.

Messrs. Redgrove & Patrick, Sevenoaks : shrubs.

Mr. G. G. Whitelegg, Chislehurst : shrubs and rock plants.

February 21, 1933. Mr. C. T. MUSGRAVE, V.M.H., in the Chair, and twenty-one other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. C. Elliott, Stevenage, for alpine and bulbous plants.

To Messrs. L. R. Russell, Richmond, for flowering shrubs.

To Messrs. Waterer, Bagshot, for Rhododendrons and alpine plants.

To Mr. G. E. Welch, Cambridge, for alpine and bulbous plants.

Banksian Medal.

To Messrs. Barr & Sons, Taplow, for Hellebores and bulbous plants.

To Messrs. Casburn, Bedford & Page, Cambridge, for alpine and bulbous plants.

To Messrs. J. Cheal, Crawley, for shrubs and alpine plants.

To Messrs. Hemsley, Crawley, for conifers and other shrubs.

To Messrs. Hillier, Winchester, for flowering shrubs.

To Hocker Edge Gardens, Cranbrook, for bulbous plants.

To Messrs. M. Prichard, Christchurch, for Saxifrages.

To Messrs. Reuthe, Keston, for shrubs and alpine plants.

To Messrs. D. Stewart, Ferndown, for shrubs, Narcissi and other bulbous plants.

To Walton Park Nurseries, Walton-on-Thames, for flowering shrubs.

Award of Merit.

To *Prunus persica* 'Russell's Red' as a hardy flowering shrub (votes unanimous), from Messrs. L. R. Russell, Richmond. An ornamental Peach of vigorous growth. The flowers are large, semi-double, and bright carmine-red in colour, flattish when fully open.

Preliminary Commendation.

To *Corydalis verticillaris* as a flowering plant for the alpine house (votes 12 for, 4 against), from E. K. Balls, Esq., Knebworth. A pretty species collected in Persia by the exhibitor in 1932. A dwarf plant with sturdy, glaucous, divided leaves and short racemes of creamy-white flowers tipped and spurred with rosy purple.

Other Exhibits.

G. P. Baker, Esq., Sevenoaks : *Colchicum Szovitsii* ?

Messrs. Baker, Codsall : shrubs.

Meilor Bridgman, Esq., Keynes : forms of *Crocus Imperati*.

Brookside Nurseries, Oxford : alpine plants.

Messrs. Clark, Dover : shrubs.

Mrs. M. Courage, Banbury : *Begonia heracleifolia*.

Messrs. Engelmann, Saffron Walden : *Kalanchoe globulifera coccinea*.

Dame Alice Godman, D.B.E., Horsham : *Ophrys lutea*.

Mrs. Holder, Newbury : *Billbergia nutans*.

Messrs. Hughes, Sutton Green : flowering shrubs.

Knap Hill Nurseries, Woking : hardy Heaths, Crocuses, etc.

Mr. E. Ladhams, Elstead : shrubs and alpine plants.

Sir Wm. Lawrence, Bt., Burford : *Griffinia Blumenavia*.

The Rev. Rollo Meyer, Hertford : bulbous Irises.

Mrs. R. S. Milford, Chedworth : shrubs and alpine plants.

Mr. G. P. Porter, Wimborne : alpine and bulbous plants.

Messrs. Redgrove & Patrick, Sevenoaks : alpine and bulbous plants.

R. D. Trotter, Esq., Ockley : *Helleborus corsicus*.

Mr. W. Wells, jun., Merstham : *Cyclamen hiemale*.

Mr. G. G. Whitelegg, Chislehurst : shrubs and alpine plants.

Messrs. Wm. Wood & Sons, Taplow : alpine plants and shrubs.

JOINT DAHLIA COMMITTEE.

August 9, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and six others members present.

Selected for trial at Wisley.

From Mr. J. F. Barwise, Burnley : ' Queen Lois ' (Garden Cactus).
 From Mr. A. J. Cobb, Reading : ' Aleth Moreau ' (Min. Pæony).
 From Mrs. Cyril Potter, Brockenhurst : ' Dubarry.'
 From Messrs. Stredwick, St. Leonards-on-Sea : ' Blue Boy ' (Dec.), ' Red Indian ' (Cactus).

August 23, 1932, Mr. T. HAY, V.M.H., in the Chair, and six other members present.

Selected for trial at Wisley.

From Messrs. Burrell, Cambridge : ' Beata ' (Small Dec.), ' Elvic ' (Small Dec.), ' Oda ' (Small Dec.), ' Ord ' (Small Dec.), ' Patience ' (Small Dec.), ' Susie ' (Small Dec.).

From Messrs. Cheal, Crawley : ' Basil ' (Small Dec.), ' Cecil ' (Small Dec.), ' Murillo ' (Mignon).

From Messrs. Stredwick, St. Leonards-on-Sea : ' Commodore ' (Dec.), ' Courageous ' (Dec.), ' D. B. Crane ' (Dec.), ' Effective ' (Cactus), ' Fairyland ' (Med. Dec.), ' Landmark ' (Cactus), ' Mrs. Geo. Chibnall ' (Dec.), ' Winnie Benge ' (Cactus).

From Mr. J. T. West, Brentwood : ' Cherub ' (Charm), ' Dignity ' (Med. Dec.), ' Maypole ' (Med. Dec.).

Dahliaes were also submitted by the following :

Messrs. Brown & Such, Maidenhead ; Mr. G. Elsom, Spalding ; Mr. S. J. Goodliffe, Bishop's Stortford ; Mr. S. J. Stent, Havant ; Mr. T. E. Toralin, Rowlands Castle.

September 6, 1932, Mr. G. W. LEAK, V.M.H., in the Chair, and eight other members present.

Selected for trial at Wisley.

From Messrs. Burrell, Cambridge : ' Fay ' (Dwf. Bedder), ' Fireflame ' (Dwf. Bedder), ' Innocence ' (Dwf. Bedder), ' Margaretta V. Drury ' (Small Dec.), ' Martha ' (Small Dec.).

From Messrs. Cheal, Crawley : ' Aden ' (Dec.), ' Buckland Star ' (Star), ' Carmel ' (Collette), ' Kingswood Star ' (Star), ' Ottawa ' (Large Dec.).

From Mr. A. J. Cobb, Reading : ' St. Patrick's ' (Min. Pæony), ' Wantage ' (Pæony).

From Messrs. Treseder, Cardiff : ' Betty ' (Min. Cactus), ' St. Fagan's ' (Dec.).

From Mr. J. T. West, Brentwood : ' Cavalcade ' (Small Dec.), ' Derwent-water ' (Small Dec.), ' Goldstar ' (Star), ' Ivory ' (Med. Dec.), ' Rubicon ' (Small Dec.), ' Seagull ' (Med. Dec.), ' Starstone ' (Star), ' Token ' (Charm).

Dahliaes were also submitted by the following :

Messrs. Blom, Cranleigh ; Messrs. Gibson & Amos, Cranleigh ; Messrs. Stredwick, St. Leonards-on-Sea.

September 13, 1932, Mr. D. B. CRANE in the Chair, and six other members present.

Selected for trial at Wisley.

From Messrs. Burrell, Cambridge : ' Celtic ' (Small Dec.), ' Evan ' (Small Dec.), ' Mary Drury ' (Small Dec.), ' Ornate ' (Small Dec.), ' Picnic ' (Small Dec.), ' Placid ' (Charm), ' Rosemary ' (Small Cactus).

From Messrs. Cheal, Crawley : ' Holmwood Star ' (Star), ' Lady Lawrence ' (Med. Dec.).

From Mr. A. J. Cobb, Reading : ' Cupid ' (Dwf. Bedder).

From Messrs. Dobbie, Edinburgh : ' Ben Lawers ' (Dec.).

From Messrs. Gibson & Amos, Cranleigh : ' Gertrude ' (Pompon), ' Joyce Adkins ' (Dwf. Bedder), ' Yellow Gem ' (Pompon).

From Messrs. Stredwick, St. Leonards-on-Sea : ' Mr. Kennard ' (Cactus), ' Pauline James ' (Cactus).

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From Messrs. Treseder, Cardiff : ' Addie ' (Min. Pæony).

From Mr. J. T. West, Brentwood : ' Brentwood Scarlet ' (Med. Dec.), ' John A. Campbell ' (Med. Dec.), ' Mrs. T. Hay ' (Med. Dec.), ' Owlet ' (Med. Dec.).

Dahlias were also submitted by the following :

Mr. A. T. Barnes, Bedford ; Mr. J. F. Barwise, Burnley ; Mr. J. H. Crosby, jun., Godalming ; Mrs. Dodd, Bracknell ; Mr. G. Elsom, Spalding ; Mr. A. E. Goodbody, Cobham ; Messrs. Carter Page, London ; Rev. W. Sherley, Oxford.

September 20, 1932, Mr. T. HAY, V.M.H., in the Chair, and seven other members present.

Selected for trial at Wisley.

From Messrs. Buckwell, St. Mary Cray : ' Red King ' (Dec.).

From Messrs. Burrell, Cambridge : ' Coral ' (Charm), ' Ernest Hewitt ' (Small Dec.), ' Glee ' (Small Dec.), ' Ian ' (Pompon), ' Marjorie Hewitt ' (Small Dec.), ' Miriam ' (Charm).

From Messrs. Cheal, Crawley : ' Colonel ' (Semi-Cactus), ' Damascus ' (Small Pæony), ' Dover ' (Small Dec.), ' Tyre ' (Collerette).

From Mr. A. J. Cobb, Reading : ' Aileen O'Brien ' (Min. Pæony).

From Mr. T. W. Pannell, Dunmow : ' Dunmow Bride ' (Small Dec.).

From Messrs. Stredwick, St. Leonards-on-Sea : ' Col. Ussher ' (Dec.), ' Mastodon ' (Dec.).

From Mr. J. T. West, Brentwood : ' Negress ' (Small Dec.).

Dahlias were also submitted by the following :

Messrs. Dobbie, Edinburgh ; Mr. H. A. Keen, Birmingham ; Mr. F. Knight, Clacton-on-Sea ; Messrs. Langridge, Westerham ; Messrs. Reeves, Norwich.

September 27, 1932, Mr. T. HAY, V.M.H., in the Chair, and eight other members present.

Selected for trial at Wisley.

From Messrs. Burrell, Cambridge : ' Edith Cartwright ' (Dec.), ' Gladsome ' (Small Dec.), ' Sid ' (Pompon), ' Toya ' (Charm).

From Mr. A. J. Cobb, Reading : ' Dawn Princess ' (Min. Pæony), ' Ridgmont ' (Min. Pæony).

From Mr. J. T. West, Brentwood : ' Attraction ' (Med. Dec.), ' Delight ' (Charm), ' Phoenix ' (Small Dec.), ' Rosy Morn ' (Med. Dec.), ' Ruby Tips ' (Small Dec.).

Dahlias were also submitted by the following :

Messrs. Brown & Such, Maidenhead ; R. Jukes, Esq., Bolton ; Messrs. Treseder, Cardiff.

October 4, 1932, Mr. T. HAY, V.M.H., in the Chair, and nine other members present.

Selected for trial at Wisley.

From Messrs. Burrell, Cambridge : ' Bee ' (Charm), ' Libra ' (Med. Dec.), ' Merle ' (Small Dec.), ' Naomi ' (Small Dec.), ' Pigmy ' (Dwf. Bedder), ' Sadie ' (Charm).

From Messrs. Stredwick, St. Leonards-on-Sea : ' Lilian Hewitt ' (Dec.), ' Ruby ' (Cactus), ' Rufus ' (Small Dec.).

From Mr. J. T. West, Brentwood : ' Autumn Bedder ' (Dwf. Bedder), ' Pearl Queen ' (Dec.).

Dahlias were also submitted by the following :

Mr. A. J. Cobb, Reading ; Mr. G. Ballego, Leiden, Holland.

ORCHID COMMITTEE.

August 9, 1932, Mr. E. R. ASHTON in the Chair, and eight other members present.

Awards Recommended :—

Preliminary Commendation.

To *Odontonia* × 'Numa' (*Odontonia* × 'Latona' × *Miltonia* × 'Wm. Pitt') (votes 7 for, 1 against), from Messrs. Charlesworth, Haywards Heath. A promising seedling displaying much crimson-red colour.

Cultural Commendation.

To A. M. Gentle, Esq., St. Albans, for *Vanda Parishii*.

To E. R. Ashton, Esq., Tunbridge Wells, for *Coeiogyne Mooreana*.

Other Exhibits.

Messrs. Sanders, St. Albans : various species and hybrids.

Messrs. Charlesworth, Haywards Heath : various species and hybrids.

F. Mercer, Esq., Steyning : *Odontoglossum crispum* var. 'The Marquis.'

The Lady Beatrix Stanley, Sibbertoft Manor, Market Harborough : *Habenaria intermedia*, from Simla.

August 23, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and eight other members present.

Award Recommended :—

First-class Certificate.

To *Cattleya* × 'Gloriette' var. *splendens* (*C.* × 'Tityus' × *C.* × *Hardyano-Warneri*) (votes 8 for), from R. Paterson, Esq., Ardingly. Award of Merit, September 9, 1930. Its chief attraction is the rich coloration of the wide labellum.

September 6, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and ten other members present.

Vote of Thanks.

To Messrs. Stuart Low, Jarvis Brook, for a group.

To Messrs. Charlesworth, Haywards Heath, for a group.

September 20, 1932, F. J. HANBURY, Esq., in the Chair, and ten other members present.

Awards Recommended :—

Award of Merit.

To *Laeliocattleya* × 'Mrs. Medo,' Stonehurst var. (*C.* × 'Venus' × *L.-c.* × *luminosa*) (votes 7 for, 2 against), from R. Paterson, Esq., Ardingly, Sussex. Texture thick, sepals and petals copper-yellow, labellum ruby-crimson.

Cultural Commendation.

To Mr. A. Merry, Orchid grower to R. Paterson, Esq., for *Cattleya* × 'Celia,' with a spike of seven white flowers.

September 27, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and six other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. Sanders, St. Albans, for a group.

Award of Merit.

To *Cattleya* × 'Paraiso' (*C. Dowiana aurea* × *C.* × 'Heliodor') (votes 6 for, 1 against), from Baron Bruno Schröder, Englefield Green, Surrey. Sepals and petals rich gold, labellum soft ruby-red.

Cultural Commendation.

To Mr. R. Cottam, gardener to Gus Mayer, Esq., Woldingham, for *Odontioda* × 'Bluebell' (parentage unknown), with a spike of forty-five flowers and buds.

Other Exhibits.

Baron Schröder : *Brassolaeliocattleya* × 'Flavida.'

Messrs. Stuart Low, Jarvis Brook : *Brassocattleya* × 'Estelle.'

Messrs. Harry Dixon, Wandsworth Common : *Laeliocattleya* × 'Canberra' var. 'Golden Morn.'

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October 4, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and five other members present.

Awards Recommended :—

Award of Merit.

To *Laeliocattleya* × 'Hayhill' (L.-c. × 'Serbia' × L.-c. × 'Zeno') (votes unanimous), from R. Paterson, Esq., Ardingly. Purplish mauve with a rich purple labellum.

To *Brassocattleya* × 'Piccadilly' var. 'Corona' (B.-c. × 'Heatherwood' × C. × 'Leda') (votes unanimous), from R. Paterson, Esq. Light rosy mauve, labellum bright purple.

To *Cattleya* × 'Thebes' var. 'Bronze King' ('Adula' × *Dowiana aurea*) (votes unanimous), from Messrs. Armstrong & Brown, Tunbridge Wells. Sepals and petals golden-buff, labellum rich ruby-red.

October 11, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen other members present. For Special Awards see p. lxvi.

Awards Recommended :—

Gold Medal.

To R. Paterson, Esq., Ardingly, Sussex, for a group.

To Messrs. Stuart Low, Jarvis Brook, for a group.

Silver-gilt Flora Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

Silver-gilt Banksian Medal.

To Messrs. Black & Flory, Slough, for a group.

To Messrs. McBean, Cooksbridge, for a group.

Silver Banksian Medal.

To Sir Jeremiah Colman, Bt., Gatton Park, Surrey, for a group of species.

To Messrs. Sanders, St. Albans, for a group.

Banksian Medal.

To Messrs. Alexander, Tetbury, for a group.

To Messrs. Cowan, Southgate, for a group.

First-class Certificate.

To *Brassocattleya* × 'Piccadilly' var. 'Corona' (votes 11 for, 4 against). This plant obtained an Award of Merit on October 4, 1932.

To *Rhynchostylis retusa alba* (unanimous), from Sir Jeremiah Colman, Bt., Gatton Park, Surrey. A pure white variety of this Indian species, also known in gardens as *Saccolabium retusum*.

Award of Merit.

To *Cattleya* × 'Aeneas' var. 'Grand Monarch' (*Dowiana aurea* × 'Venus') (votes 10 for), from Messrs. McBean. Sepals and petals golden-copper colour, labellum ruby-crimson.

To *Maxillaria ocephylla* (votes unanimous), from Sir Jeremiah Colman, Bt. A distinct and rare species, mainly golden-yellow, tinged with orange, the labellum with whitish apex.

To *Brassolaeliocattleya* × 'Elektron' var. 'Golden Orb' (B.-l.-c. × 'Amber' × C. × *Hardyana*) (votes 12 for), from Baron Schröder, Englefield Green, Surrey. Sepals and petals clear yellow, labellum golden-yellow, front lobe suffused with mauve-purple.

Cultural Commendation.

To Messrs. McBean, for *Oncidium varicosum*, bearing two spikes with an aggregate of 100 flowers.

Other Exhibits.

Messrs. Harry Dixon, Wandsworth Common : various species and hybrids.

Mr. John Evans, Colwyn Bay : various Orchids.

October 25, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and fourteen other members present.

Awards Recommended :—

First-class Certificate.

To *Laeliocattleya* × 'Ishtar,' Exbury var. (C. × 'Fabia' × L.-c. × 'Sargon') (votes 13 for), from Lionel de Rothschild, Esq., Exbury. Spike of three large flowers, with broad mauve-purple sepals and petals, and a round labellum of rich purple, tinged with ruby on the front lobe.

Award of Merit.

To *Sophrolaeliocattleya* × 'Beacon' var. *lustrissima* (C. × 'Fabia' × S.-l.-c. × 'Virginia') (votes 12 for), from Messrs. H. G. Alexander, Tetbury. Flowers deep purple, labellum crimson-purple with gold lines in the throat.

To *Odontonia* × 'Tyeana' (*Odontonia* × 'Nesta' × *Odontoglossum* × 'St. James') (votes 9 for, 4 against), from Messrs. Charlesworth, Haywards Heath. Spike of six wide flowers, the sepals and petals blotched with rose-red, the labellum with a red-brown base and a rose-speckled apex.

To *Laeliocattleya* × 'Princess Margaret' var. 'Imperial' (C. × 'Clotho' × L.-c. × 'Profusion') (votes 11 for), from Messrs. McBean, Cooksbridge. The sepals and well-developed petals soft rosy mauve, the labellum with a purple front and a yellowish disc on each side lobe.

To *Cattleya* × 'Muriel Henderson' ('Fabia' × *Thomasii*) (votes unanimous), from F. J. Hanbury, Esq., East Grinstead. Spike of fine well-formed flowers, rich violet-purple, the labellum having a golden disc on each side lobe.

Vote of Thanks.

To Messrs. Charlesworth, for a group.

To Messrs. McBean, for a group.

To Messrs. H. G. Alexander, for a group.

To Messrs. Sanders, St. Albans, for a group.

Other Exhibits.

Messrs. Stuart Low, Jarvis Brook : *Brassocattleyas* and *Laeliocattleyas*.

Lionel de Rothschild, Esq., Exbury : *Cypripedium* × 'Redstart.'

F. J. Hanbury, Esq., East Grinstead : *Laeliocattleyas*.

November 22, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and thirteen other members present.

Awards Recommended :—

Gold Medal.

To Robert Paterson, Esq., Ardingly, Sussex, for a group.

First-class Certificate.

To *Brassocattleya* × 'British Queen,' Stonehurst var. (B.-c. × *Digbyano-Mendelii* × C. × 'Lord Rothschild') (votes 13 for, 1 against), from R. Paterson, Esq., Ardingly, Sussex. Flowers immense, rosy mauve, labellum fringed and with an orange-yellow centre.

Preliminary Certificate.

To *Odontoglossum* × 'Brockhurst Beauty' ('Lucretia' × 'St. James') (votes 11 for, 1 against), from F. J. Hanbury, Esq., East Grinstead. Flowers round, heavily blotched with chocolate-red.

Lindley Medal.

For *Vuylstekeara* × 'Edna,' Stamperland var. (*Miltoniodes* × *Harwoodii* × *Odontioda* × *Charlesworthii*), from R. Paterson, Esq., Ardingly. The plant bore three spikes with a total of about fifty flowers.

Cultural Commendation.

To Mr. A. Merry, Orchid grower to R. Paterson, Esq., Ardingly, Sussex, for *Brassocattleya* × 'British Queen,' Stonehurst var., with five immense flowers.

To Mr. Arthur George, gardener to W. Van de Weyer, Esq., Cliffe, Dorchester, for *Zygopetalum intermedium*, with seventeen spikes.

Other Exhibits.

Messrs. Sanders, St. Albans : various Orchids.

Messrs. Stuart Low, Jarvis Brook : various Orchids.

Messrs. H. G. Alexander, Tetbury : various Orchids.

Messrs. McBean, Cooksbridge : various Orchids.

Messrs. A. J. Keeling, Bradford : *Cypripediums*.

Messrs. Charlesworth, Haywards Heath : various Orchids.

Dr. F. Craven Moore, Duckyls, East Grinstead : *Cypripedium* × 'Brigadier.'

F. J. Hanbury, Esq., East Grinstead : *Odontoglossum* hybrids.

December 14, 1932, Sir JEREMIAH COLMAN, Bt., in the Chair, and sixteen other members present.

Awards Recommended :—

First-class Certificate.

To *Sophrolaeliocattleya* × 'Tokio' var. 'Brilliance' (L.-c. × 'Ivanhoe' × S.-l.-c. × 'Hirohito') (votes unanimous), from Baron Bruno Schröder, Englefield Green, Surrey. Flower of medium size, the sepals and petals ruby, the labellum ruby-crimson and frilled at the margin.

To *Laeliocattleya* × 'Hilary' (C. × 'Fabia' × L.-c. × 'Soulange') (votes 13 for), from Robert Paterson, Esq., Ardingly, Sussex. A large flower of fine form and substance, the sepals and petals rosy mauve, the labellum rich crimson.

Award of Merit.

To *Sophrolaeliocattleya* × 'Nanette,' Clovelly var. (C. × 'Dinah' × S.-l.-c. × 'Meuse') (votes unanimous), from F. Mercer, Esq., Steyning, Sussex. Flower

well formed, the sepals and petals carmine-rose, the labellum ruby-crimson with a yellow base.

To *Cypripedium* × *Bromilowianum*, Gatton Park var. ('Christopher' × 'Selene') (votes unanimous), from Sir Jeremiah Colman, Bt., Gatton Park, Surrey. An attractive flower of large size, the dorsal sepal yellowish-green, the petals and labellum pale honey-yellow.

To *Odontioda* × 'Uvalda' (*Odontioda* × 'Synia' × *Odontoglossum crispum*) (votes 10 for, 2 against), from Messrs. Charlesworth, Haywards Heath. A distinct hybrid with a spike of eleven flowers, the segments heavily marked with light orange-brown.

Other Exhibits.

Messrs. Stuart Low, Jarvis Brook : various species and hybrids.

Mr. John Evans, Colwyn Bay : *Cypripediums* and *Miltonias*.

Messrs. A. J. Keeling, Westgate Hill, Bradford : *Cypripediums*.

Messrs. Charlesworth, Haywards Heath : *Odontoglossums*.

Messrs. McBean, Cooksbridge : various Orchids.

Dr. F. Craven Moore, Duckyls, East Grinstead : *Cypripedium* × 'Pickwick.'

Sir Jeremiah Colman, Bt., Reigate : *Cypripediums*.

Lionel de Rothschild, Esq., Exbury : *Cypripedium Wardii*.

F. J. Hanbury, Esq., East Grinstead : *Cypripediums*.

H. P. Lawson, Esq., Woking : *Phalaenopsis Lueddemanniana* var. *ochracea*.

January 10, 1933, Mr. LIONEL DE ROTHSCHILD in the Chair, and fifteen other members present.

Awards Recommended :—

Gold Medal.

To Messrs. H. G. Alexander, Tetbury, for *Cypripediums*.

To Messrs. Armstrong & Brown, Tunbridge Wells, for *Cypripediums*.

Silver-gilt Banksian Medal.

To Dr. F. Craven Moore, Duckyls, East Grinstead, for *Cypripediums*.

To Messrs. Black & Flory, Slough, for *Cypripediums*.

Silver Banksian Medal.

To Messrs. Charlesworth, Haywards Heath, for a group.

To Messrs. Sanders, St. Albans, for a group.

Banksian Medal.

To E. R. Ashton, Esq., Tunbridge Wells, for a group.

To Guy P. Harben, Esq., King's Somborne, for a group.

To Messrs. H. Dixon, Wandsworth Common, S.W., for a group.

To Messrs. A. J. Keeling, Bradford, for a group.

To Messrs. Sanders, St. Albans, for a group.

To J. Evans, Colwyn Bay, for a group.

Vote of Thanks.

To Sir Jeremiah Colman, Bt., Gatton Park, Surrey, for a group.

To Lionel de Rothschild, Esq., Exbury, for a group.

To Messrs. McBean, Cooksbridge, for a group.

To Messrs. Stuart Low, Jarvis Brook, for a group.

First-class Certificate.

To *Miltonia* × 'Mrs. Carl Holmes,' Stonehurst var. ('Gertrude West' × *pulchra*) (votes 12 for, 4 against), from Robert Paterson, Esq., Ardingly, Sussex. Rich ruby-crimson, shaded with rose at the margin.

Award of Merit.

To *Laeliocattleya* × 'Windermere,' Clovelly var. (*C. Trianae* × *L.-c.* × 'Morus') (votes 14 for), from F. Mercer, Esq., Steyning, Sussex. A large and well-formed flower of bright mauve-purple colour.

To *Phalaenopsis* × *Rothschildiana* var. 'Grace' (*amabilis* × *Schilleriana*), (votes 14 for, 1 against), from Messrs. Sanders. Flowers white flushed with pale violet.

To *Cypripedium* × 'Nena' var. 'Our Queen' ('Christopher' × 'Senator'), (votes 10 for), from Messrs. Black & Flory. A large flower with white dorsal sepal with a green base.

To *Cypripedium* × 'Grace Darling' var. 'Princess' ('Gwen Hannen' × 'Phantasy') (votes unanimous), from Messrs. Black & Flory. An attractive clear honey-yellow flower, except that the dorsal sepal is margined white.

To *Odontoglossum* × 'Excella,' Stonehurst var. (*crispum* × 'Eximillus') (votes 13 for, 1 against), from Robert Paterson, Esq. The flowers are large, bluish-white, the sepals and petals marked with reddish-purple.

To *Cypripedium* × 'Mrs. Eley,' Gatton Park var. ('Christopher' × 'Commodore') (votes 15 for), from Sir Jeremiah Colman, Bt. An elegant flower of large size, the dorsal sepal white, much marked with dark purple spots.

To *Catasetum rostratum* (votes 14 for, 1 against), from Messrs. Charlesworth. Provisionally named, but probably a form of *C. Naso*. The erect spike bore twelve flowers, light greenish with red-brown marking.

To *Vuystekeara* × 'Cambria' (*Odontonia* × 'Clonius' × *V.* × 'Rudra') (votes 14 for), from Messrs. Charlesworth. The spike bore one glowing rich crimson flower.

To *Cypripedium* × 'Ambition' (*Fairrieianum* × 'Gwen Hannen') (votes unanimous), from Lionel de Rothschild, Esq. Flower of large size, the dorsal sepal whitish, marked with radiating lines and spots of dark purple.

Cultural Commendation.

To Mr. B. F. Perfect, Orchid grower to Sir Jeremiah Colman, Bt., Gatton Park, Surrey, for *Haemaria discolor*, with twenty spikes of flowers.

To Messrs. Sanders, St. Albans, for *Cypripedium Fairrieianum*.

Other Exhibits.

F. J. Hanbury, Esq., East Grinstead : *Laeliocattleya* × 'Sunbelle.'

H. P. Lawson, Esq., Knaphill, Surrey : *Renanthera* species.

Mrs. Bruce, Bridge Hall, Bury : *Cypripedium* × 'Murmur' var. 'Zephyr.'

The Director, Royal Botanic Gardens, Kew : *Paphiopedilum Wardii*.

January 24, 1933, Mr. LIONEL DE ROTHSCHILD in the Chair, and thirteen other members present.

Awards Recommended :—

Banksian Medal.

To T. O. Stevens Perry, Esq., Hartland, Sheerwater Avenue, West Byfleet, for *Cypripediums*.

Award of Merit.

To *Cymbidium* × 'Dorchester' (*Alexanderi* × 'Tityus') (votes 7 for, 3 against), from R. Paterson, Esq. Flowers large, blush-pink, labellum marked with red.

To *Cypripedium* × 'Palmerston,' Langley var. ('Gertrude West' × 'J. M. Black') (votes 10 for), from Messrs. Black & Flory. An attractive flower with the dorsal sepal heavily marked with dark purple.

To *Cypripedium* × 'Doris Black' var. 'Venus' ('Florence Spencer' × 'Golden Wren') (votes unanimous), from Messrs. Black & Flory. A pleasing greenish gold flower.

Other Exhibits.

Baron Schröder, Englefield Green : *Brassolaeliocattleya* × 'Flavida.'

F. J. Hanbury, Esq., East Grinstead : *Odontoglossum* × 'W. Hanbury Aggs.'

Messrs. Keeling & Sons, Bradford : *Cypripediums*.

Messrs. Armstrong & Brown, Tunbridge Wells : *Cypripediums*.

Messrs. H. G. Alexander, Tetbury : *Cypripediums*.

Messrs. Sanders, St. Albans : various Orchids.

Messrs. Black & Flory, Slough : *Cypripediums*.

February 7, 1933, Mr. F. J. HANBURY, F.L.S., V.M.H., in the Chair, and eighteen other members present.

Awards Recommended :—

Award of Merit.

To *Odontonia* × 'Cissa' (*Odontonia* × 'Alexandra' × *Odontoglossum* × 'Tityus') (votes 13 for), from Messrs. Charlesworth, Haywards Heath. Sepals and petals blotched and marked with red, the flat labellum having red markings at the base.

To *Cypripedium* × 'Halcyon' ('Prince Albert' × 'Robert Paterson') (votes 8 for, 2 against), from Messrs. Charlesworth. A large flower, the dorsal sepal having a green base much spotted with dark purple.

To *Cypripedium* × 'Amy Johnson' ('Memoria F. M. Ogilvie' × 'Mulatto') (votes 11 for), from W. H. Dinham King, Esq., Inglewood, Whiterock, Brixham. A showy flower with broadly developed petals and roundly formed dorsal sepal.

To *Cypripedium* × 'Freemantle,' Langley var. ('Sir J. M. Barrie' × 'Soulangé') (votes 15 for), from Robert Paterson, Esq., Ardingly, Sussex. The dorsal sepal large and white with purple suffusion at the base, the petals brown shaded with green.

To *Odontoglossum* × 'President Hoover' var. 'Compact' ('Arcturus' × 'Prince Imperial') (votes 11 for, 4 against), from Messrs. McBean, Cooksbridge. Flowers mahogany-red, segments margined blush-white.

Cultural Commendation.

To Mr. E. V. Kent, Orchid grower to E. R. Ashton, Esq., Broadlands, Tunbridge Wells, for a fine specimen of *Ada aurantiaca*.

Vote of Thanks.

To Dame Alice Godman, D.B.E., South Lodge, Horsham, for a well-grown plant of *Epidendrum polybulbon*.

Other Exhibits.

Sir Jeremiah Colman, Bt., Gatton Park : *Pleurothallis puberula*.

Messrs. Charlesworth, Haywards Heath : various Orchids.

Messrs. McBean, Cooksbridge : various Orchids.

Messrs. A. J. Keeling, Bradford : *Cypripedium* hybrids.

Messrs. Armstrong & Brown, Tunbridge Wells : *Cypripedium* hybrids.

Messrs. Stuart Low, Jarvis Brook : various Orchids.

February 21, 1933, Sir JEREMIAH COLMAN, Bt., in the Chair, and eighteen other members present.

Awards Recommended :—

Silver Banksian Medal.

To Messrs. McBean, Cooksbridge, for a group.

To Messrs. Sanders, St. Albans, for a group.

First-class Certificate.

To *Laeliocattleya* × 'Ajax' (C. × 'Clotho' × L.-c. × 'Mme. Brasseur Hye') (votes 13 for, 3 against), from Messrs. Charlesworth, Haywards Heath. Flower of large size and well formed, light mauve with royal purple on the labellum.

Award of Merit.

To *Odontoglossum* × 'St. Hilda' var. 'Supreme' ('crispo-Solon' × *eximium*) (votes 14 for, 3 against), from Messrs. Charlesworth. Flowers well formed, crimson-brown except for a narrow white margin to all the segments.

To *Cymbidium* × 'Aladdin' ('Martin' × 'Toucan') (votes 12 for, 4 against), from Lionel de Rothschild, Esq., Exbury, Southampton. An attractive hybrid with salmon-pink flowers tinged with rose, the labellum having a red apical blotch.

To *Cymbidium* × 'Cassiopea,' Penton's var. ('Castor' × *Lowianum*) (votes 10 for, 3 against), from Carl Holmes, Esq., The Node, Codicote, Hitchin. Flowers of large size and light apple-green colour; the labellum cream-coloured with red-brown markings at the apex.

Preliminary Commendation.

To *Laelia* × 'Firefly' ('Coronet' × *harpophylla*) (votes 16 for), from Messrs. Armstrong & Brown, Tunbridge Wells. Several examples of this novelty, which bears flowers of clear orange-red colour, were staged.

Cultural Commendation.

To Messrs. Charlesworth, Haywards Heath, for *Odontonia* × *Longwoyi* (*Mil-tonia Schroederiana* × *Odontoglossum* × *Uro-Skinneri*), with two many-flowered spikes.

Other Exhibits.

Messrs. H. G. Alexander, Tetbury : various Orchids.

Messrs. A. J. Keeling, Bradford : *Cypripediums*.

Messrs. Stuart Low, Jarvis Brook : various Orchids.

F. J. Hanbury, Esq., East Grinstead : *Odontoglossum* hybrids.

Lady Hadden, Berkhamstead : *Cypripedium* × *Ashburtonii*.

Messrs. Charlesworth, Haywards Heath : *Odontoglossums*.

Sir Jeremiah Colman, Bt., Gatton Park : *Sophronitis grandiflora*.

Robert Paterson, Esq., Ardingly : *Cypripedium* hybrids.

Messrs. Black & Flory, Slough : *Cypripediums*.

DONORS OF PLANTS, ETC., TO WISLEY DURING 1932.

- AIRD, Col. W. A., Oregon, U.S.A. Bulbs of Lily 'Big Chief.'
- ALGERS UNIVERSITY BOTANIC GARDEN. Collection of seeds.
- ALLWOOD BROS., Messrs., Haywards Heath. *Dianthus* hybrids and Carnations for trial.
- APPS & Co., Messrs. A. E., 5, Steward St., E. 1. Onion, Parsley, Radish, Stock, Marrow, Peas, for trial.
- AUSTIN, E., Windsor Forest, Berks. Dahlia for trial.
- BACKHOUSE NURSERIES, Messrs., York. *Dianthus* for trial.
- BAKER, G. P., Sevenoaks. Collection of seeds.
- BAKERS, LTD., Messrs., Codsall, Wolverhampton. *Dianthus*, Pyrethrums, for trial; and collection of plants.
- BALFOUR, A. P., Slough, Bucks. *Verbascum Lagurus*.
- BALLEGO & ZONEN, Messrs., Leiden, Holland. Dahlia for trial.
- BALLS, E. K., Knebworth, Herts. *Tulipa violacea*?
- BARR & SONS, Messrs., Covent Garden, W.C. 2. Asters, Phlox, Pyrethrums, *Dianthus*, Stocks, Onions, Parsley, Radishes, Marrow, for trial; and Asters for Rock Garden.
- BARRES, DOMAINE DES, à Nogent-sur-Vernisson. Collection of seeds.
- BARRETT, B. A., Thames Ditton. Perennial Phloxes for trial.
- BARTHOLOMEW, A. C., Reading. Collection of seeds.
- BARTHORP, G. M., Sudbury, Suffolk. *Lycoris radiata*?
- BARURSE, J. F., Burnley. Dahlia for trial.
- BASEL BOTANIC GARDEN, Switzerland. Collection of seeds.
- BATH, Messrs. R. H., Wisbech. Pinks, Pyrethrums, for trial; Double White Daisies.
- BEALE, L. A., Chatham. *Dianthus* 'Napoleon III.'
- BECKETT, E., Elstree, Herts. Perennial Asters for trial.
- BELGIUM UNIVERSITY BOTANIC GARDEN. Collection of seeds.
- BENARY, Messrs. E., Erfurt, Germany. *Dianthus*, Peas, Radishes, Onions, Parsley, Stocks, for trial.
- BENNETT, A. H., British Columbia. Collection of seeds.
- BERGIANUS BOTANIC GARDEN, Stockholm 50. *Gentiana cruciata*, *Gentiana septemfida*, *Primula algida* var. *sibirica* f. *colorata*, *Primula cortusoides*.
- BERLIN-DAHLEM BOTANIC GARDEN, Germany. Collection of seeds.
- BERN BOTANIC GARDEN. *Gentiana pannonica*.
- BESANT, J. G., Harrogate. Plants of *Calceolaria*, Gilbert's var.
- BIRCH REYNARDSON, Miss, Stroud. *Lilium pyrenaicum rubrum*.
- BIRLEY, Mrs. F. H., Sevenoaks. White scented Delphinium.
- BLACKMORE & LANGDON, Messrs., Bath. Primulas, Phlox, Delphiniums, for trial.
- BODGER SEEDS LTD., Messrs., California, U.S.A. Collections of seeds; *Calendulas*, *Dianthus*, Aster, for trial.
- BONES, T., Cheshunt, Herts. Asters for trial.
- BONN UNIVERSITY BOTANIC GARDEN, Germany. Collection of seeds.
- BOOTHMAN, H. S., Gravetye, E. Grinstead. *Sanguinaria canadensis* fl. pl.
- BOTFIELD, Mrs. GARNETT-, Wolverhampton. Primulas for trial.
- BOWELS, F. W., Payneham, South Australia. Collection of seeds.
- BRIDGEFORD, J. M., Covent Garden, W.C. 2. *Lewisia Howellii*, *Lilium candidum*, *Salonika* var.
- BRIGHT, F., Shinfield, Reading. Carnation for trial.
- BRITTON, Miss, Tiverton, Devon. *Anemone sylvestris grandiflora*, *Primula Waltonii*, *Pelargonium* cuttings.
- BROOKSIDE NURSERIES LTD., Oxford. Large quantity of *Lonicera yunnanensis*; collection of plants.
- BROWN, F. C., Byfleet, Surrey. *Salvia Moorcroftiana*; cuttings of *Ceanothus floribunda*; collection of Iris seed.
- BROWN & Co., Messrs. D. T., Lancs. Radish, Marrow, for trial.
- BRUSSELS BOTANIC GARDEN. Collection of seeds.
- BUCAREST BOTANIC GARDEN, Roumania. *Myricaria germanica*.
- BUDAPEST BOTANIC GARDENS, Hungary. Collection of Iris seeds.
- BUNYARD LTD., Messrs., Maidstone. Irises for trial; *Lilium Willmottiae*.

CXXIV PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

BURGOYNE, C., Cape Town. Collection of seeds.

BURGOYNE, C., Chilworth. Rhododendrons.

BURRELL & Co., Messrs. J., Cambridge. Dahlias for trial.

BURROUGHS, Mrs., Cobham, Surrey. *Ixia leucantha*, *Protea marginata*.

BYNG OF VIMY, The Rt. Hon. VISCOUNTESS, Thorpe-le-Soken. Collection of seeds and plants.

BYVOET & Co., LTD., Messrs. P., Overveen, Holland. Gladioli for trial.

CAMBRIDGE BOTANIC GARDEN. Collection of seeds.

CARLÉE LTD., Messrs. H., Haarlem, Holland. Dahlia for trial.

CARLISLE, Mrs., Basingstoke, Hants. Collection of seeds.

CARTERS TESTED SEEDS LTD., Raynes Park, S.W. 20. Culinary Peas, Radishes, Parsley, Marrows, Onions, Stocks, Dianthus, for trial.

CAYEUX & LE CLERC, Messrs., Paris. Gladioli for trial.

CHANCE, F. H., Cobham, Surrey. Plant of *Campanula hederacea*.

CHEAL & SONS, LTD., Messrs. J., Crawley, Sussex. Dahlias for trial.

CHELSEA PHYSIC GARDEN, S.W. Collection of seeds.

CHEZ NOUS NURSERIES, Newick, Sussex. Dianthus for trial.

CHITTENDEN, F. J., Todd House, West Clandon. *Abutilon Theophrasti*, *Ribes glandulosum*, *Sagittaria cuneata*; seeds from Coral Island to be grown on for naming; *Momordica* sp.

CHITTENDEN, F. J., West Clandon, Surrey. Plant of *Nymphaea* 'Colonel Walsh,' *Lilium Thomsonianum*.

CHRISTIE, T. NORTH, Llanbryde, Morayshire. *Primula Winteri* and *Meconopsis simplicifolia*, Bailey's var.

CHURCHER, Capt. G., Nr. Wrotham, Kent. Gladiolus for trial.

CHURCHER, Major G., Lindfield, Sussex. Gladioli for trial.

CLARKE, Colonel STEPHENSON, Haywards Heath. Magnolia, Rhododendrons, *Meconopsis Dhwojii*.

CLIBRANS, LTD., Messrs., Altrincham. Onion for trial.

CLUCAS, LTD., Messrs., Ormskirk, Lancs. Stocks, Onion, Parsley, Marrow, Radishes, Peas, for trial.

CLUTTERBUCK, Sir PETER, Walton-on-Thames. *Clematis hexasepala*.

COBB, A. J., Reading University. Dahlias for trial.

COCHRANE, Miss N., Windlesham, Surrey. *Scabiosa africana*, *Anchusa riparia*, *Ursinia anthemoides*, *Chamaeas heterophylla*.

COIMBRA BOTANICAL INSTITUTE, University, Portugal. Collection of seeds.

COLLINS, E. J., Mostyn Road, Merton, S.W. 19. Calceolarias for trial.

CONSTABLE, W. A., Paddock Wood, Kent. Collection of Lilies.

COOKE, R. B., Corbridge-on-Tyne. Collection of seeds.

COOPER, McDUGALL & ROBERTSON, LTD., Messrs., Yalding, Kent. Tins of Drymac, Nos. 1 and 2.

COOPER & SON, LTD., Messrs. G., Bedford. Marrow, Parsley, Onion, for trial.

COPELAND, T., Wokingham, Berks. Corms *Colchicum luteum*.

COUSENS, H. L., Egham. *Caesalpinia pulcherrima* 'Barbados Pride' (red variety).

COWAN, Dr. J. M., Edinburgh. *Nothospartium Carmichaeliae*, *Hoheria* sp.

CUTBUSH & SON, Messrs. WM., Barnet, Hertfordshire. Stocks, Onion, Vegetable Marrow, Parsley, Peas, for trial.

DAEHNFELDT & JENSEN, LTD., Messrs., Denmark. Radishes, Parsley, for trial.

DALRYMPLE, G. H., Bartley, Southampton. *Primula pulverulenta*, Bartley strain, *Watsonia Beatricis*.

DANIELS BROS., Messrs., Norwich. Stocks, Onions, Dianthus, for trial.

DAWKINS, Messrs. A., Chelsea, S.W. 10. Parsley, Onions, Radishes, Stocks, Dianthus, for trial.

DE MOLE & KISCH, Messrs., Maritzburg, N.P. Dahlias for trial.

DENNY, C.B.E., Mrs. HENRY, Staplefield, Sussex. *Meconopsis betonicaefolia*, *Magnolia macrophylla*, *Magnolia parviflora*, *Primula pulverulenta*, Bartley strain.

DE ROTHSCHILD, O.B.E., LIONEL, Southampton. Rhododendrons.

DICKSON BROWN & TAIT, LTD., Messrs., Manchester. Onion for trial.

DICKSON, Miss, Dunscore, Dumfriesshire. *Iris chrysographes*.

DICKSON & ROBINSON, Messrs., Manchester. Dahlias for trial.

DIJON BOTANIC GARDEN, France. Collection of Iris seed.

DIVERS, W. H., Hook Rd., Surbiton. Grafts of Apples.

DOBBIE & Co., LTD., Messrs., Edinburgh. Peas, Parsleys, Vegetable Marrows, Onions, Radishes, Stocks, Nasturtium, Chrysanthemum, Gladioli, Pyrethrum, for trial; Lilies, *Lonicera sempervirens magnifica*; collection of Roses.

DOWNER, G. R., Chichester. Aubrietia for trial.

DRESDEN BOTANIC GARDEN, Germany. Collection of Gentiana and Iris seed.

- DUNEDIN BOTANIC GARDEN, New Zealand. Collection of seeds.
 DUNN, Captain, Mallorca. Acacia 'La Mimosa Real,' *Centaurea conifera*.
 DUVAL, Rev. S. P., Littlehampton, Sussex. *Datura Stramonium*.
 DYKES, Mrs., Pyle Hill, Woking. Irises for trial.
 EDINBURGH ROYAL BOTANIC GARDEN. Large collection of seeds, bulbs, and
Primula sonchifolia, *Keteleeria Fortunei*, *Primula Wollastoni*, *Lilium nepalense*
burmanicum, *Viburnum grandiflorum*.
 ELLIOTT, LTD., Messrs. CLARENCE, Stevenage, Herts. *Allium* sp. No. 791,
Mutisia alba, *Oxalis arborea*, *Puya coerulea*, *Solanum heterophyllum*, *Leuco-*
coryne ixioidea odorata, *Calceolaria Darwinii*, and other plants.
 ENGELMANN, Messrs. CHAS., Saffron Walden. Carnations for trial.
 FARRAND, Mrs., Maine, U.S.A. *Tripterygium Regelii*.
 FENWICK, MARK, Stow-on-the-Wold. Collection of plants, cuttings and seeds ;
Helieborus orientalis, *Meconopsis Wallichii*, *Primula Winteri*, *Malva pedata*.
 FERRY MORSE SEED CO., California. Garden Peas, Parsley, Radishes, Vegetable
 Marrows, Stocks, for trial.
 FINDLAY, R., R.H.S. Gardens, Wisley. *Pyracantha* berries.
 FORBES LTD., Messrs. JOHN, Hawick, Scotland. Phlox, Stocks, Pyrethrums, for
 trial.
 FRIETSCH, LEOPOLD, Germany. Gladioli for trial.
 FRIKART, CARL, Stäfa, Switzerland. Collection of seeds.
 GAME, Mrs. GWENDOLINE, Australia. Collection of seeds.
 GEMMELL & Co., Messrs. R. H., Glasgow. Parsley for trial.
 GENEVA BOTANIC GARDEN. Collection of seeds.
 GIBSON & AMOS, LTD., Messrs., Cranleigh, Surrey. Dahlia for trial.
 GIBSON & Co., Messrs. G., Leeming Bar Nurseries, Yorks. Poppies for trial.
 GLASGOW BOTANIC GARDEN. Collection of seeds.
 GODDEN, Lt.-Col. J. B. H., Sherborne, Dorset. Collection of seeds.
 GOODALLS, LTD., Messrs., Durham. $\frac{1}{2}$ gal. tin of "Nopest" insecticide.
 GOODESPEED, T. H., Berkely, California. Collection of seeds.
 GOUDE, H., Norwich. Grafts of Pears.
 GRONINGEN BOTANIC GARDEN, Holland. Collection of *Dianthus* and *Iris* seeds.
 HAAGE & SCHMIDT, Messrs., Erfurt, Germany. Spinach, Carrots, Calendulas,
 Tagetes, for trial.
 HALL, Sir DANIEL, John Innes Hort. Institution, S.W. 19. Fuchsia sp.
 HARDING, H., Crowborough. Lettuce for trial.
 HARE HILL NURSERY CO., LTD., Messrs., Pyrford, Woking. Plants of *Cupressus*
Lawsoniana Allumii.
 HARLEY, A., Blinkbonny, Kirkcaldy. *Gentiana Farreri*, *Gentiana stragulata*,
Gentiana sino-ornata, *Gentiana Veitchiorum*, *Meconopsis Wallichii*.
 HARRISON & SONS, Messrs., Leicester. Stocks, Marrows, Peas, Onions, Parsley,
 Radishes, for trial.
 HASKINS & SONS, Messrs. H., Branksome Nurseries, Bournemouth. Rhododen-
 drons.
 HAWKER, Capt. H. G., Ermington, Devon. *Abies Forrestii*, *Abies Webbiana*,
Arisaema speciosum, *Cortia Hookeri*, *Rhododendron lanatum*, *Sophora Griffithii* ;
 and collection of seeds.
 HAY, T., Hyde Park, London. Collection of plants, seedlings and seeds ; also
Omphalogramma Elwesiana (*Primula Elwesii*), *Primula Pantlingii*, *Primula*
Wattii.
 HAYWARD & SONS, P. S., Clacton-on-Sea. *Dianthus* for trial.
 HEADFORT, THE MARQUESS OF, Kells, Co. Meath. Cuttings of *Salix Fargesii*,
Drimys colorata.
 HEINEMANN, Messrs. F. C., Erfurt, Germany. Onion, Radishes, Stocks, *Dianthus*,
 for trial.
 HEMSLEY, H., Crawley. *Dianthus* for trial.
 HERB, Messrs. M., Naples, Italy. Calendula, Tagetes, *Dianthus*, Marrows,
 Parsley, Radish, Onions, for trial.
 HERBERT, C. H., Acocks Green, Birmingham. *Dianthus* for trial.
 HERIOT, Lady MAITLAND, Ruthwell. Seedlings of *Primula ianthina*.
 HERKLOTS, C. A. C., University, Hong Kong. Collection of seeds.
 HEYES, P. W., Preston. Parsley, culinary Peas, Onion, Radishes, for trial.
 HILL, Mrs., Plumtree, Notts. Stag's Horn Fern.
 HILTON, Dr. C. T., British Columbia. *Lilium columbianum*.
 HINDLEY, G. E., Guildford, Surrey. *Chamaelaucium uncinatum*.
 HOKKAIDO IMPERIAL UNIVERSITY BOTANIC GARDEN, Japan. Collection of
 seeds.
 HOLMES, J., Farmakin Hardy Plant Farm, Renfrewshire. *Gentiana sino-ornata*,
Lilium Martagon dalmaticum, *Rhododendron Augustinii*.

CXXVI PROCEEDINGS OF THE ROYAL HORTICULTURAL SOCIETY.

- HOLMES, W. G., Tain. Culinary Pea for trial.
- HUGHES, Mrs., Fleet, Hants. *Primula* 'Lady Clanwilliam,' *Primula* seedlings.
- HUMPHREY, A., Henfield, Sussex. Begonias for trial.
- HUNTER, J. A., Auckland, New Zealand. *Sophora tetraptera*, *Ranunculus Lyallii*, *Arthropodium cirrhatum*.
- HURST & SON, Messrs., 152, Houndsditch, E.C. 3. Culinary Peas, Vegetable Marrow, Parsley, Radishes, Onions, Calendulas, Godetia, Dianthus, Stocks, for trial.
- INGRAM, COLLINGWOOD, Benenden, Kent. *Paeonia obovata alba*.
- JACKMAN & SON, Woking, Surrey. Clematis.
- JAMES, The Hon. ROBERT, Richmond, Yorks. Lilliums.
- JARMAN & Co., Messrs., Chard, Somerset. Dahlia for trial.
- JASSY UNIVERSITY BOTANIC GARDEN, Roumania. Collection of seeds.
- JEFFERIES & SON, LTD., Messrs. J., Cirencester. Onion for trial.
- JEKYLL, F., Munstead House, Godalming. *Ebenus creticus*; and collection of seeds, bulbs and corms.
- JENKIN, Dr., Hindhead. Collection of plants.
- JENKINSON, Captain, Knaphill Nurseries, Surrey. Rhododendron plants.
- JOHNSON, A. T., Conway, N. Wales. Collection of seeds.
- JOHNSON, D., Highland Nursery, Ripley. Phlox for trial.
- JOHNSON & SON, LTD., Messrs. W. W., Boston, Lincs. Onions, Parsley, Radishes, culinary Peas, Stocks, for trial.
- JONES, LTD., Messrs., Lewisham. Asters for Floral Dept., Phlox for trial.
- JOYCE GREEN HOSPITAL, per Dr. A. F. CAMERON, Dartford, Kent. Plants of *Morus viscidula*, *Paulownia Fargesii*, *Phellodendron Lavalleyi*, *Romneya Coulteri* × *trichocalyx*.
- KAY & Co., Messrs., Goodmayes, Essex. *Ixia* ?, *Ifafa* Lilies mixed, Natal Crocus.
- KELWAY & SON, Messrs., Langport. Phlox, culinary Peas, Onions, Parsley, Radishes, Vegetable Marrow, Stocks, Pæony, Campanula, Gladioli, Pyrethrums for trial; and *Gladiolus Murielae*.
- KERFOOT, J. R., Linton via Skipton. Seedling of *Dianthus alpinus*.
- KERR & Co., Messrs., Glasgow. Stocks, Parsley, for trial.
- KEW ROYAL BOTANIC GARDEN. Collection of seeds and plants.
- KEY, Mrs., Caterham Valley, Surrey. Seeds of Thistles from Tangier.
- KIRSTENBOSCH NATIONAL BOTANIC GARDEN. Collection of seeds.
- KÖNIGSBERG BOTANIC GARDEN, Germany. Collection of seeds.
- KONYENBURG & MARK, Messrs., Holland. Gladioli for trial.
- KRAKOWIO BOTANIC GARDEN, Jagiellonskiego University, Poland. Collection of Iris and Gentiana seed.
- KYNASTON, A. L., Nr. Bath. Collection of seeds.
- LAING & MATHER, Messrs., Kelso, Scotland. Peas, Parsley, Onion, Stock, for trial.
- LANGRIDGE & Co., Messrs. H., Westerham, Kent. Dahlia for trial.
- LANSDALL, F., Saltdean, Brighton. Plants of *Primula juliae* × 'Wilson's Blue.'
- LAUSANNE BOTANIC GARDEN. Collection of seeds.
- LAWRENCE, Sir WM., Bt., Burford, Dorking. Tomato, Spinach, for trial; and collection of plants.
- LAXTON BROS., Messrs., Bedford. Culinary Peas for trial.
- LEIDEN BOTANIC GARDEN, Holland. *Gentiana cruciata*, *G. Kesselringii*.
- LEMOINE, Messrs., Nancy, France. Phlox for trial.
- LEMPERG, Dr. FRITZ, Hatzendorf, Austria. *Lychnis*, *Juglans*, *Hypericum*, Clematis, *Eucalyptus*, *Aster*, *Rydbergia*, *Gentiana*, *Campanula*, *Cedronella*, *Callicarpa*, for trial; and collection of seeds.
- LENINGRAD BOTANIC GARDEN, Russia. Collection of seeds.
- LEVY, B., Wankie, S. Rhodesia. *Talinum cuneifolium*.
- LEXINGTON BOTANIC GARDEN, Mass., U.S.A. Collection of seeds.
- LEVCESTER, Miss, Cork, I.F.S. Nandi Flame Tree, *Spathodea campanulata*.
- LITHUANIA BOTANIC GARDEN. Collection of seeds.
- LOBJOIT, Sir WM., Wooburn. Grafts of Apple.
- LOTHOUSE, T. ASHTON, Middlesbrough. Collection of plants and seeds.
- LONG, E. P., Viceregal Gardens, New Delhi. Collection of seeds and seeds of Lilies; *Lilium Thomsonianum*.
- LONGFIELD, H. F., Douglas, Co. Cork. *Drimys Winteri*.
- LONGSTAFF & SONS, Messrs., 27, Belmore Street, S.W. 8. Gladioli for trial.
- LOW & Co., Messrs. STUART, Enfield. Collection of plants.
- LOWNDES, Captain D. G., Waziristan, India. *Tulipa stellata*.
- LOWNDES, G. R., 27, Chesham Place, S.W. 1. *Sophora Griffithii*.
- LUND BOTANIC GARDEN, Sweden. *Iris spuria*, *I. versicolor* × *virginica*.

DONORS OF PLANTS, ETC., TO WISLEY DURING 1932. CXXVII

- LUNEVALE PRODUCTS LTD., Messrs., Lancaster. 14 lb. tin of colloidal lead arsenate, 1 lb. tin of "Lethalate" wet preparation.
- LOWOW EXPERIMENTAL STATION, Poland. *Ranunculus Thora*, *Rhododendron* sp.?, *Primula* 'Minerva.'
- MACAULEY, R. H., Argyll. *Gentiana Lawrencei*, *G. Farreri*, *Cyananthus incanus*, *C. lobatus* K.W. 5949, *Meconopsis quintuplinervia*; and collection of seeds.
- MACDONALD SEED CO., California. Stocks for trial.
- MCDOWALL, K., Stranraer, Scotland. *Lilium hyacinthinum*.
- MC EWEN, Brig.-Gen. D. L., Dalbeattie. Plants *Rhododendron lacteum*.
- MCGILLIVRAY, SIR ALEXANDER, Barbados. Palm seeds.
- McLAREN, Hon. H. D., Tal-y-Cafn. Collection of plants; *Rhododendron* × *cilpinense*, *Gentiana sino-ornata*.
- MADRID BOTANIC GARDEN. *Gentiana decumbens*, *G. depressa*.
- MAGOR, E. P., St. Tudy R.S.O., Cornwall. *Lilium formosanum* var. *leucanthum*.
- MARBURG BOTANIC GARDEN. *Gentiana cruciata depressa*, *Geranium Wilfordi*, *Iris Collettii*.
- MARCHAM, H., Carshalton, Surrey. Anchusas for trial.
- MEAD, F. B., Fort Wayne, Indiana. Iris for trial.
- MELBOURNE DEPARTMENT OF AGRICULTURE, per Mr. F. J. CHITTENDEN. Collection of seeds.
- MESSEL, Lt.-Col., Handcross. Collection of plants and bulbs of *Liliums*.
- METCALFE, A. W., Luton, Beds. Plants of *Nasturtiums*.
- MEYER, Rev. ROLLO, Watton-at-Stone. *Iris ruthenica*, *I. reticulata*.
- MILLARD, W., Tunbridge Wells. *Guaiacum officinale*.
- MILN & Co., Messrs., Chester. Maincrop Peas for trial.
- MITCHELL, W. F., Leek Wootton, Nr. Warwick. Culinary Pea for trial.
- MITSCH, GRANT E., Oregon, U.S.A. Gladioli for trial.
- MOLLOY, Mrs. H., Vernon, B.C. Seed of Wild Sunflower; Mariposa Lily.
- MONRO & Co., G., Waltham Cross. 10 gallons Monro's "B" Wash.
- MONTGOMERY, Mrs., Hill of Down, Co. Meath. 'Hose in Hose' Cowslip.
- MORRIS, R. A., Birmingham. Parsley, Peas, Vegetable Marrows, Stocks, for trial.
- MORTON ARBORETUM, THE, Illinois, U.S.A. Collection of seeds.
- MULLIGAN, B. O., Long Ashton, Nr. Bristol. Plants of *Primula chionantha* × *sino-purpurea*, *Primula Waltonii*.
- MÜNDEM BOTANIC GARDEN, Germany. Collection of seeds.
- MUSGRAVE, C. T., Godalming. Large plate camera; collection of seeds, seedlings, plants and cuttings.
- NAPIER, Lt.-Col. GUY, Horeham Road, E. Sussex. *Lilium Martagon*, *L. Duchartrei*.
- NEDHAM, C. W., Hale, Chester. Dianthus for trial.
- NOTCUTT, R. C., Woodbridge, Suffolk. Collection of plants.
- OHLENS ENKE, Messrs. J. E., Copenhagen. Parsley, Radishes, for trial.
- OSLO BOTANIC GARDEN, Norway. Collection of seeds.
- OWERMOIGNE NURSERIES, Dorchester. Dianthus for trial.
- PALMES, Mrs., Fulford, Yorks. *Chionodoxa* 'Naburn Blue.'
- PAM, Major, Broxbourne, Hertford. Seeds and corms.
- PARIS BOTANIC GARDEN, France. Collection of seeds.
- PATERSON, Dr. A. GORDON, Bracknell, Berks. *Inula ensifolia*.
- PEARMAN, J. BARTON, Warnham, Sussex. Dahlia for trial.
- PECKHAM, Mrs. WHELER, New York. Iris for trial.
- PENNELL, J., Kingston Hill, Surrey. Collection of seeds.
- PERRETT & Co., Messrs. W., Weymouth. Culinary Peas for trial.
- PERRY, AMOS, Enfield. Chrysanthemum, Hemerocallis, for trial; Lilies.
- PFITZER, Wm., Germany. Gladioli, Phlox, Carnations, Parsley, Radishes, Onion, for trial.
- PHILLIPS, Mrs. MARTHA, California. Cactus seeds.
- PIKE, Mrs., Bexhill-on-Sea. Seeds for naming.
- PILKINGTON, G. L., Woolton, Liverpool. Irises for trial.
- PRAGUE, UNIVERSITY BOTANIC GARDEN. Collection of seeds.
- PREMEX PRODUCTS, London, E.C. 3. Liquid non-poisonous soil insecticide.
- PROUDLOCK, R. L., c/o Midland Bank, Jersey. Tuber of "Snake Potato" from South India.
- RAFFILL, C. P., Richmond. *Lilium chalcedonicum*, *L. Brownii colchesteri*, *L. Wardii*.
- REUTHE, G., Hardy Plant Nursery, Keston. *Schizocodon macrophyllum*.
- RICE, JEROME B., SEED CO., New York, U.S.A. Radish, culinary Peas, for trial.
- RIDING, J. B., Chingford, E. 4. Dahlias for trial.
- RIVOIRE PÈRE & FILS, Messrs., Lyons. Stocks for trial.

- ROBINSON, H., Burbage, Hinckley. Pyrethrums for trial.
- ROSENHEIM, P., East Molesey, Surrey. Collection of Lilies and Fritillarias.
- RUYS, LTD., Messrs. B., Dedemsvaart, Holland. Phlox for trial.
- RYDER & SON, Messrs., St. Albans, Herts. Onion, Marrow, Stock, Radish, for trial.
- ST. CYRES, VISCOUNTESS, 54, Prince's Gate, S.W. *Actinidia chinensis*.
- SALBACH, CARL, California, U.S.A. Gladioli for trial.
- SANDEMAN, F. D. STEWART, Kingennie, Angus. Collection of seeds and seedlings.
- SANDFORD, R., Mildenhall, Suffolk. Dahlia for trial.
- SAUNDERS, L. H., Nigeria, W. Africa. *Coreopsis Barteri*, *Dopatum longidens*, *Securidacea longipedunculata*.
- SCHOMBER, R. C. F., Ross, Herefordshire. Clematis (unnamed), Melon.
- SELLENS, W., Goldsworth Rd., Woking. Perennial Phlox.
- SHANKS, F. J., Christchurch, New Zealand. *Lilium formosanum*.
- SIFTON, H. B., Dept. of Botany, Toronto, Canada. Collection of seeds.
- SIMPSON, A. L., Cheadam, Surrey. *Tsuga Mertensiana*, *Picea pungens glauca*, *Libocedrus decurrens*.
- SIMPSON, Messrs. W. H., Birmingham. Lupinus, Pyrethrums, Stocks, Dianthus, Onions, Marrows, Radishes, Parsley, Peas, Lupins, for trial.
- SLAVIN, Mr., Rochester, New York, U.S.A. *Pinus sylvestris* var. *fastigiata*.
- SLINGER, Mr., Newcastle, Co. Down. *Dierama pulcherrimum*.
- SLOCOCK, Messrs. W., Goldsworth Nurseries, Woking. Specimens of *Cupressus Lawsoniana* and *C. Lawsoniana* var. 'Boskoop'; plants of Rhododendrons, Clematis and Cupressus.
- SOLLY, Miss, Harpenden, Herts. Collection of seeds and plants for Rock Garden.
- SPEED & SONS, Messrs. H. J., Evesham. Peas, Onions, Radishes, Parsley, Marrows, for trial.
- SPENDER, R. E., Abingdon, Berks. Irises.
- STAFFORD, Miss, Peruvian Expedition. Collection of seeds.
- STARK & SON, Messrs., Norfolk. Pink for trial; Poppies.
- STERN, Major F. C., Goring-by-Sea, Sussex. Buds of *Rosa* \times *highdownensis*; plants of *Clematis Forrestii* and *C. montana* var. *Wilsonii*, and var. *platysepala*; and collection of plants and seeds; Irises for trial.
- STEVENSON, J. B., Tower Court, Ascot. Large collection of Rhododendrons.
- STOKER, Dr. F., Loughton. Collection of plants.
- STOOKE, J. E. H., Danesmere, Hereford. *Piptanthus nepalensis*, seedlings of Lilies.
- STOUT, A. B., New York, U.S.A. Lily 'Cinnabar,' Lily 'Bijou,' for trial.
- STREDWICK & SON, Messrs. JAMES, St. Leonards-on-Sea. Dahlias for trial.
- STUTTGART HIGH SCHOOL BOTANIC GARDEN, GERMANY. Collection of seeds.
- SUTTON & SONS, Messrs., Reading. Chrysanthemum, Dianthus, for trial; Chrysanthemums for comparison.
- TABOR BOTANIC GARDEN. Collection Iris and Gentiana seed.
- TAYLOR, G., Edinburgh. *Clematis afoliata*.
- TAYLOR, G., Gerrards Cross, Bucks. Plant of Panicum?
- TAYLOR, W. P. G., Godalming. Collection of seeds.
- TECHNICAL PRODUCTS LTD., 31, Great St. Helen's, E.C. 3. "Horticultural Spray," "Winter Wash."
- THERKILDSEN, K., Kew, Southport. Dianthus for trial.
- THOMSON, P. MURRAY, Bridge Sollers, Hereford. Primrose and Polyanthus seeds.
- TIFLIS BOTANIC GARDEN. Collection of Iris seed.
- TINCKER, Dr. M. A. H., Wisley. *Psidium Guajava* var. *pyriferum*; rhizomes of Ginger, *Zingiber officinale*.
- TODD, H. J., Blackheath. Collection of seeds.
- TODD, Lt.-Col. ENEVER, Gibraltar. Collection of seeds and plants.
- TOLLER, W. G., Woodbridge, Suffolk. Pyrethrums for trial.
- TOMALIN, T. E., Rowlands Castle, Hants. Dahlias for trial; cuttings of *Olearia Traversii*, *Psidium Cattleianum*.
- TOPSVOORT, Messrs., Aalsmeer. Dahlia for trial.
- TRACEY, Mrs. J. A., Wimborne. *Vallea stipularis*, corms of *Gladiolus triphyllus*.
- TRAHERNE, C. P., Aberkenfig, Glamorgan. *Desfontania spinosa*, *Phygellus capensis*.
- TRESEDER, LTD., Messrs. W., Cardiff. Dahlias for trial.
- TROTTER, R., Ockley, Surrey. Collection of corms.
- TROUP, R. D. R., Buckland Newton. *Stellaria Webbia*.
- TUCKERS, LTD., Messrs., Brookside Nurseries, Oxford. *Trollius pumilus*, *Morisia hypogaea*.
- UGGESHALL RECTORY GARDENS, Suffolk. Plants of Primrose 'Helio.'
- UNWIN, LTD., Messrs. W. J., Histon, Cambs. Gladioli for trial.

- UPPSALA BOTANIC GARDEN, Sweden. Collection of seeds.
- UTRECHT BOTANIC GARDEN, Holland. *Gentiana frigida*, *G. scabra*, *G. sibirica*.
- VANCOUVER UNIVERSITY BOTANIC GARDENS. Collection of seeds.
- VANDERSCHOOT, Messrs. J. B., Holland. Delphiniums for trial.
- VAN TUBERGEN, Messrs. C. G., Haarlem, Holland. Phlox for trial.
- VARIAN, W., 171, Kyverdale Road, N. 16. Dianthus for trial.
- VASEY, A., 52, London Wall, E.C. 4. Lilies, Helenium 'Moerheim Beauty.'
- VAUGHAN'S SEED STORE, Chicago, Illinois. Dianthus for trial.
- VELTHUYS & CO., LTD., Messrs. K., Hillegom, Holland. Gladioli for trial.
- VICEREGAL GARDENS, New Delhi, India. Collection of seeds, plants and bulbs.
- VIENNA BOTANIC GARDEN. Collection of seeds.
- VILMORIN-ANDRIEUX & CIE., Messrs., Paris. Collection of seeds.
- VINSEN, C. L., Redbourn, Herts. Perennial Aster for trial.
- WALLACE & Co., Messrs. R., Tunbridge Wells. Iris for trial; Lily bulbs; collection of seeds.
- WALLER FRANKLIN SEED CO., California, U.S.A. Stocks, Dianthus, for trial.
- WARBURG, Sir OSCAR, Headley, Epsom. Collection of seeds, plants and cuttings.
- WATKINS & SIMPSON, Messrs., Covent Garden, W.C. 2. Peas, Stocks, Dianthus, Onion, Parsley, Radishes, Marrows, for trial.
- WATT, J. CROMER, Aberdeen. *Rhododendron Auchlandii* × *R. Wardii*; collection of seeds, cuttings and Strawberry runners.
- WEEKS, A. G., Limsfield Common, Surrey. *Gentiana verna* (*angulosa*).
- WELLINGTON, R., Geneva, N.Y. Grafts of Plums 'Hall,' 'Albion.'
- WELLS, Messrs. W., Merstham. Phlox for trial.
- WEST, J. T., Brentwood, Essex. Phlox, Lupin, Dahlias, for trial.
- WHITE, J., By Dunoon, Argyll. *Lilium tigrinum*.
- WHITHAM, R. P. MUSGRAVE, Shepperton-on-Thames, Middlesex. Dianthus?
- WHITTEN, Miss H. M., Upper Norwood, S.E. 19. *Asclepias fruticosa*.
- WILLIAMS, A. M., Launceston. *Rhododendron lacteum*.
- WILLIAMS, J. E., Cornwall. *Primula Agleniana*.
- WILLIAMS, J. G., Cardiff. *Magnolia sinensis*.
- WILLMOTT, Miss ELLEN, Great Warley, Essex. Collection of seeds.
- WILSON, E. K., Cannizaro, Wimbledon. Collection of plants and cuttings.
- WILSON, THOMAS, Streatham, S.W. *Loiseleuria procumbens*.
- WOOD & SON, LTD., Messrs. Wm., Taplow, Bucks. Phlox for trial.
- WRAY, C., Grayshott, Hindhead. *Saxifraga cochleata*, *Sempervivum gloriosum*.
- WRIGHT, Mrs. S. C., Lancaster. Seeds from Kenya.
- YATES & SONS, Messrs., Evesham. Radishes, Parsley, Onion, Marrow, for trial.
- YEREX LILY GARDENS, Tigard, Oregon. *Lilium pardalinum* var. *giganteum*, *L. sulphureum*.
- YOUNG, A., Garmouth-by-Elgin. Delphinium for trial.
- YOUNG, J. F., Woodbridge, Suffolk. Cuttings *Echium fastuosum*.
- ZÜRICH UNIVERSITY BOTANIC GARDEN, Switzerland. Collection of seeds.
- ZWAAN & DE WILJES SEED CO., Messrs., Holland. Carrots, Spinach, for trial.
- ZWAAN & VAN DER MOLEN, Messrs., Holland. Parsley, Radishes, for trial.

BOOKS AND PAMPHLETS PRESENTED, PURCHASED OR REVIEWED DURING THE HALF-YEAR ENDING DECEMBER 31, 1932, AND DEPOSITED IN THE LIBRARY.

- 1 = Purchased.
- 2 = Presented by Mrs. A. E. Watkins.
- 3 = " " Mrs. Rutherford.
- 4 = Sent for Review.
- 5 = Presented by Sir Jeremiah Colman.
- 6 = " " the Author.
- 7 = " " Mr. A. Reynell.
- 8 = " " the Director, Royal Botanic Gardens, Kew.
- 9 = " " Mr. J. B. Stephenson.
- 10 = " " Mrs. H. E. Irene Hall.
- 11 = " " Mr. J. Key Allen, F.S.A.
- 12 = " " Miss J. Clarke.
- 13 = " " Mr. Lionel de Rothschild.

Abbreviations.—Col. pls. = coloured plates; illus. = illustrated; rev. = revised; pls. = plates; ed. = editor, edited or edition; n.d. = no date; n.p. = no place (of publication given).

When books are published in London, the place of publication is not named in the entry.

- A. A. L. H. Notes from a Lincolnshire garden. 8vo. 1903. (1)
- Allen, Charles Linnaeus. Bulbs and tuberous-rooted plants: their history, description, methods of propagation, etc. Illus. 8vo. New York, 1907. (1)
- Allen, Grant. The story of the plants. 2nd ed. Illus. 8vo. 1896. (2)
- Alpine Flowers. 12 col. pls., with 57 illus. 8vo. Zürich, n.d. (3)
- Amateur's handbook of gardening, The. See GARDENING.
- Andersson, N. J. Monographia *Salicum*. (K. Sv. Vet.-Akad. Handl. vi. n. 1.) Illus. 4to. [Stockholm, 1867.] (1)
- Andrews, Ewart S. Mechanisms. A text-book for the use of non-technical students. Illus. 8vo. 1926. (4)
- Andrews, James [*Illus.*]. See CHOICE GARDEN FLOWERS.
- Auchter, E. C., & Knapp, H. B. Orchard and small fruit culture. 2nd ed. Illus. 8vo. New York, 1932. (4)
- Ayres, William P. See GARDEN COMPANION AND FLORISTS' GUIDE.
- Bainbridge, Richard. Guide to the conservatory. 8vo. 1842. (1)
- Barnes, James, & Robinson, William. Asparagus culture: the best methods employed in England and France. Illus. 8vo. New York, n.d. (1)
- Barton-Wright, E. C. Recent advances in botany. Illus. 8vo. 1932. (4)
- Batsford, Harry, & Fry, Charles. Homes and gardens of England. With a foreword by Lord CONWAY OF ALLINGTON. Illus. 8vo. 1932. (4)
- Battandier, J. A. Sur quelques cas d'hétéromorphisme. (Bull. Soc. Bot. Fr. xxx.) Illus. 8vo. Paris, 1883. (1)
- Notes critiques sur quelques espèces méditerranéennes. (Assoc. Franc. Avance. Sci. Congr. Toulouse.) Illus. 8vo. Toulouse, 1887. (1)
- Quelques mots sur les causes de la localisation des espèces d'une région. (Bull. Soc. Bot. Fr. xxxiv.) 8vo. Paris, 1887. (1)
- Note sur quelques genres de la famille des Synanthérées. (Assoc. Franc. Avance. Sci. Congr. Paris.) 8vo. Paris, 1889. (1)

- Battandier, J. A.** Note sur une Saxifrage nouvelle [*Saxifraga baborensis*] de la section *Cymbalaria* Grisebach trouvée dans le massif des Babors (Algérie). (Bull. Herb. Boiss. i.) Illus. 8vo. Geneva, 1893. (1)
- Étude des Euanagallis annuels de la région méditerranéenne. (Bull. Soc. Hist. Nat. Afriq. Nord, iv.) 8vo. Algiers, 1912. (1)
- Le milieu agent modificateur des espèces. (Bull. Soc. Hist. Nat. Afriq. Nord, Suppl. 2.) 8vo. Algiers, 1914. (1)
- Description d'une espèce nouvelle d'*Anthemis* [*A. carthaginis*]. (Bull. Soc. Hist. Nat. Afr. Nord, viii.) 8vo. Algiers, 1917. (1)
- Description d'une nouvelle espèce de *Linaria* [*L. Peltieri*]. (Bull. Soc. Hist. Nat. Afr. Nord, xii.) 8vo. Algiers, 1921. (1)
- Labiée ligneuse du Maroc constituant un nouveau type générique [*Pitardia nepetoides*]. (Bull. Stat. Recherch. Forest. Nord Afriq. i.) Illus. 8vo. Algiers, 1921. (1)
- Battandier, J. A., & Trabut, L.** Description du *Pancratium saharæ* Cosson (inédit). (Rev. gén. Bot. ii.) Illus. 8vo. Paris, 1890. (1)
- Description d'une nouvelle espèce du genre *Urginea* Steinhil [*U. noctiflora*]. (Assoc. Franc. Avance. Sci. Congr. Besançon.) 8vo. Paris, 1893. (1)
- Beecher, Henry Ward.** See WARNER, C. D. My summer in a garden.
- Beeton, S. O.** The book of garden management. Illus. 8vo. [1862.] (1)
- Bellynck, A.** Catalogue des plantes soit spontanées, soit cultivées en grand observées en Belgique à l'usage des herborisations. 8vo. Namur, 1876. (1)
- Benary, Ernst.** Album Benary. Parts 1-7. Col. pls. 4to. Erfurt, 1876-82. (1)
- Bennett, Alfred W.** See THOMÉ, O. W. Text-book.
- Bergius, Peter Jonas.** Descriptiones plantarum ex Capite Bonae Spei. Illus. 8vo. Stockholm, 1767. (1)
- Bishop, David.** Causal botany; or a treatise on the causes and character of changes in plants, especially of changes which are productive of subspecies or varieties. 8vo. 1829. (1)
- Bisset, Peter.** The book of water gardening. Illus. 4to. New York, 1907. (1)
- Boer, Petrus de.** Specimen botanicum inaugurale coniferis Archipelagi Indici. Illus. 4to. Utrecht, 1866. (1)
- Boll, Ernst.** Flora von Meklenburg . . . (Archiv Ver. Fr. Nat. Meklenburg, xiv.) 8vo. Neubrandenburg, 1860. (1)
- Nachtrag. (Archiv Ver. Fr. Nat. Meklenburg, xviii.) 8vo. Neubrandenburg, [1864]. (1)
- Bommer, J. E.** Monographie de la classe des Fougères. (Bull. Soc. R. Bot. Belg. v.) Illus. 8vo. Brussels, 1867. (1)
- Book of garden management, The.** See BEETON, S. O.
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ERRATA.

P. 200, l. 23, for **Maisie Low** read **Malsie Lowe**.

P. xxxv, the medal awarded to Messrs. Wallace was a *Gold Medal*, not a *Silver-gilt Banksian*.

NOTICES TO FELLOWS.

On October 24 and 25, 1933, in addition to the Meeting in the New Hall special for Orchids, there will be an Exhibition in the Old Hall of SOUTH AFRICAN WILD FLOWERS specially sent from the Cape, and under the patronage of His Excellency the Governor General and the High Commissioner for the Union of South Africa. The Exhibition will include Heaths, Proteas, Kniphofias, Ornithogalums and many other plants of the Cape Flora. Fellows' tickets admit.

TWO NEW PUBLICATIONS.

DAFFODIL YEAR-BOOK, 1933. Just published. Price 5s., in cloth 6s.

LILY YEAR-BOOK, 1933. To appear shortly and to contain the full Report of the Lily Conference in July 1933. Price (to Fellows) 5s., in cloth 6s.

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